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Identification and Status of Sensitive Bat Habitat Resources on the Marine Corps Air Station Yuma, Barry M. Goldwater Range, and Yuma Proving Ground

Year 1 – Final Report

Identification and Status of Sensitive Bat Habitat Resources on the Marine Corps Air Station Yuma, Barry M. Goldwater Range, and Yuma Proving Ground

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INTRODUCTION

The United States Marine Corps (USMC), U.S Air Force (USAF), and U.S. Army (USA) are responsible for the management and environmental compliance of the Barry M. Goldwater Range-West (BMGR-West; USMC), Barry M. Goldwater Range-East (BMRG-East; USAF), and Yuma Proving Ground (YPG; USA) respectively. Military training on installations require the three branches of the Department of Defense (DoD) to minimize operational impacts on any federal or state sensitive species, as declines in these species have a potential to prompt listing or delay de-listing under the Endangered Species Act (ESA). The importance of abandoned mines and caves for bats lies in their potential to provide a variety of roosting sites including maternity, hibernacula, day, night, and interim roosts (Sherwin et al. 2000). Maternity roosts provide a secure location for females to give birth and rear their young throughout the summer season (Humphrey 1975). Hibernacula provide a winter refuge for non-migratory bats (Johnson et al. 1998, Kuenzi et al. 1999, Raesly and Gates 1986). Day roosts are used by non-reproductive individuals of both sexes while night roosts are utilized by all bats, regardless of reproductive status, as a place to rest and to digest their prey between foraging bouts (Lacki et al. 1994, Kerth et al. 2001). Night roosts are generally in different locations than day roosts and are used primarily at dawn and dusk (Anthony et al. 1981). Day roosts are substantial roosts that harbor bats during the daytime hours. Interim roosts are used in the spring before the young are born and again in the fall before retreating to the hibernation or winter roost (Dobkin et al. 1995, Twente 1955). Abandoned mines and natural caves may serve all of the above functions, thus accurate surveys of bat activity types are essential in identifying and preserving these bat roosts.

Military readiness includes mission activities using caves and mines for training. Therefore, it is important to minimize the impact of these training activities on bat communities within these sites. There are many potential sensitive bat species listed by the Arizona Game and Fish Department (AGFD) and the Department of the Interior (DOI). These species were the focus of a DoD Species at Risk assessment in Arizona and New Mexico as part of a DoD funded legacy project. Military activities on these installations have the potential to impact the federally listed lesser longed-nosed bat (*Leptonycteris curasoae*) (Schull 1988; USFWS 1995). Military activities may additionally affect the Pallid bat (*Antrozous pallidus*), cave myotis (*myotis velifer*), Yuma Myotis (*Myotis Yumanensis*), Mexican free-tailed bat (*Tadarida brasiliensis*), Townsend's Big-eared bat (*Corynorhinus townsendii*) and California Leaf-nosed bat (*Macrotus californicus*). The lesser long-nosed bat has been observed foraging on BMGR-East and roosting in areas on adjacent federal lands (Sidner and Davis 1988). We have recognized that the first step in preventing any potential wildlife and military activity conflicts is to specifically identify where these conflicts may exist.

This project evolved through discussions among members of the Sonoran Desert Conservation Partnership Team (a joint DoD, State and Federal natural resource management agencies partnership) and those at the DoD Southwest Regional Workshop. The Sonoran Conservation Partnership Team (SCPT) has recognized the need to protect current military readiness and provide increased flexibility to respond to new missions while minimizing any potential impacts to wildlife. For bats, this first step is to identify all potential roosting structures to effectively provide recommendations for military personnel that will best minimize any negative impacts to natural resources.

This project identified potential bat roost structures on the three southwestern installations by developing a landscape scale GIS model that identifies the location of potential subterranean features (i.e., caves and mines). We surveyed and documented all subterranean features, and propose a sampling regime that can be used to monitor all bat species at-risk and of concern while maintaining mission critical activities.

Study Objectives

The primary objectives of this project are as follows:

1. Identify potential bat roost structures (caves, crevices and mines) on the Barry M. Goldwater East and West Ranges and Yuma Proving Ground for the presence of bats.
2. Map and describe the roost site characteristics for each identified bat roost site.
3. Document bat species present within identified bat roosts.
4. Provide management and population sampling recommendations that can be used to monitor sensitive bat species while maintaining mission activities.

METHODS

Study Area

The study area was comprised of BMGR-East (managed by USAF) and West (managed by USMC) and YPG (managed by USA) in southwestern Arizona (Figure 1). It is important to note that the U.S. Marine Corps Air Station (MCAS) Yuma lies within the general boundaries of BMGR-West. Each installation is divided into sections for aerial systems training, live-fire training and ground maneuvers. The ranges together cover approximately 3,700 square miles of Lower Colorado River Subdivision of the Sonoran Desert. Steep mountain ranges are surrounded by expansive, sparsely vegetated valleys and wide, shallow washes. The elevation ranges from approximately 260-2600 ft. Average rainfall is often less than 3 in and summer temperatures can exceed 111°F. Dominant vegetation includes creosotebush (*Larrea tridenta*), white bursage (*Ambrosia dumosa*), Palo Verde (*Parkinsonia* spp.), mesquite (*Prosopis* spp.), ironwood (*Olneya tesota*) and various cacti (Brown 1994).

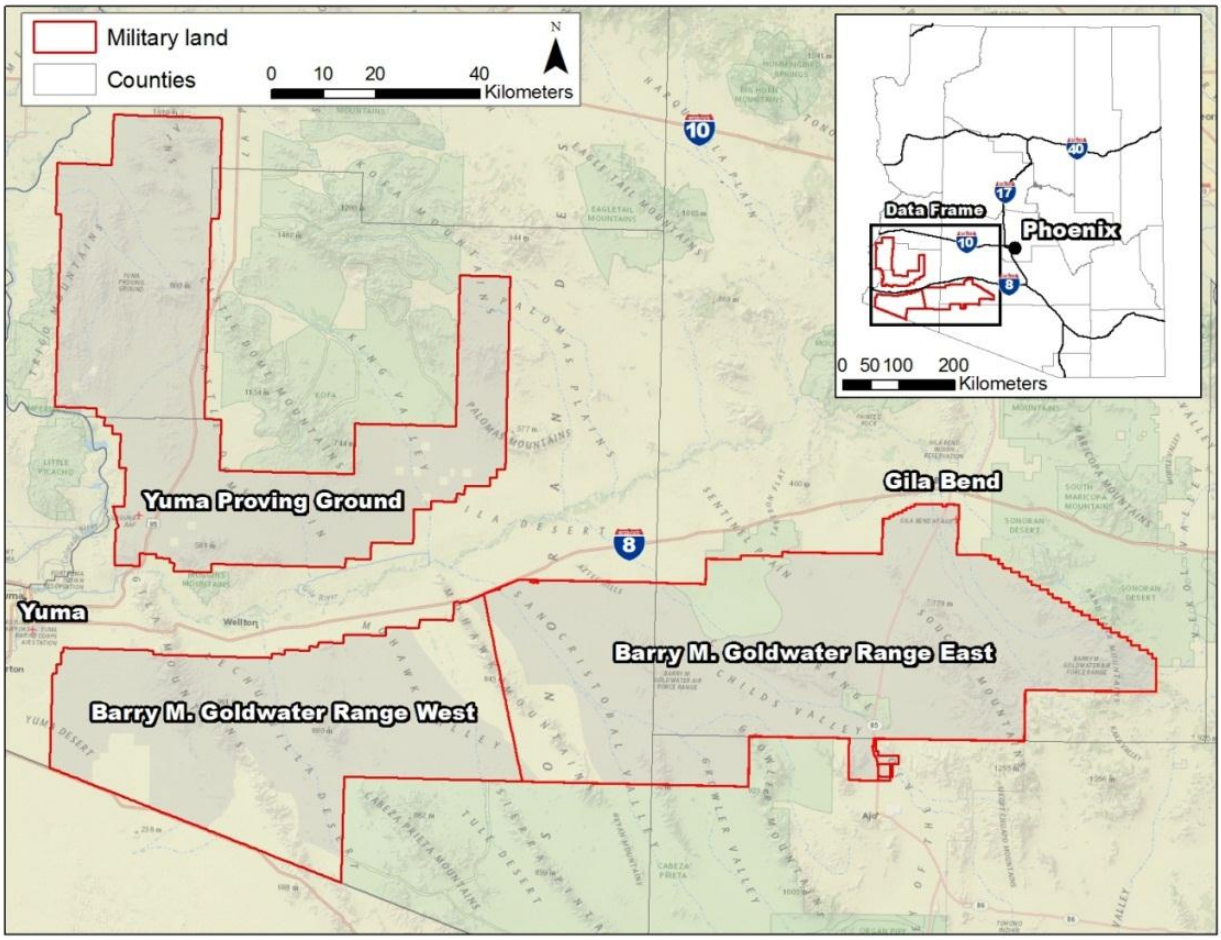


Figure 1. Study area for the identification and status of sensitive bat habitat resources in on military installations in southwestern Arizona, 2011.

Yuma Proving Ground

YPG lies within La Paz and Yuma counties near Yuma, Arizona and totals approximately 2,144 mi². Kofa National Wildlife Refuge is adjacent to YPG for 58 miles (USDI 1996). Lower Colorado River subdivision of the Sonoran Desert is the predominating vegetative community within YPG. This vegetative community is the largest and most arid component within the Sonoran Desert and characterized by extremely drought-tolerant plant species such as creosote (*Larrea tridentata*), bursage (*Ambrosia dumosa*), paloverde (*Parkinsonia* spp. and cacti (e.g., *Opuntia* spp. and *Carnegiea gigantean*) (Brown 1994). The broad, flat and sparsely vegetated desert plains of YPG are dissected by numerous incised washes that harbor ironwood (*Olneya tesota*), smoketree (*Psorothamnus spinosa*), acacia (*Acacia greggii*), mesquite (*Prosopis* spp.) and numerous shrub species (Brown 1994). Elevated hills and mountain slopes contain vegetation consisting of Arizona Upland Subdivision of the Sonoran Desert with sotol (*Dasylirion wheeleri*), cacti and agave (*Agave* spp.). The here elevation ranges between sea level to 2880 m. The average temperatures on YPG are between 61° F (December) and 86° F (July) (Atmospheric Sciences Laboratory, YPG Central Meteorological Observatory), with average annual rainfall of approximately 3.5 in.

Barry M. Goldwater Range

BMGR (BMGR-East and BMGR-West) lies within Pima, Maricopa and Yuma counties, and extends from Yuma eastward towards Gila Bend, Arizona. BMGR is bounded to the south by Mexico and Cabeza Prieta National Wildlife Refuge, to the north by Interstate-8 and a mix of private and public properties, and to the east by the Tohono O'odham Nation and Bureau of Land Management (BLM) lands. Elevations range from below 200 ft on western portions to 3700 ft in the Sand Tank Mountains (BMGR 2007). Temperatures on BMGR can range from below 32° F (rare) to 120° F, with a range-wide average annual rainfall of approximately 5 inches (BMGR 2007). The Lower Colorado River subdivision of the Sonoran Desert is the predominate vegetative community and is characterized by extremely drought-tolerant plant species such as creosote (*Larrea tridentata*), bursage (*Ambrosia* spp.), paloverde (*Parkinsonia* spp.) and cacti (e.g., *Cylindropuntia* spp. and *Carnegiea gigantea*) (Brown 1994). The broad, flat and sparsely vegetated desert plains of BMGR are dissected by numerous incised washes that harbor ironwood (*Olneya tesota*), smoketree (*Psorothamnus spinosa*), acacia (*Acacia greggii*), mesquite (*Prosopis* spp.), ocotillo (*Fouquieria splendens*) and numerous shrub species.

Model Development

In order to identify potential bat roost structures (caves, crevices, and mines), we developed a Geographic Information System (GIS) based modeling framework. We structured the framework around known bat roost locations within the study area to determine what macro-site conditions exist that support roosting bats in mines and caves. We included a dataset of known bat roosts (n= 234; Appendix B) was on BMGR-East and YPG. This historical inventory was surveyed by Dalton and Dalton (1994) and Dames and Moore (1996) and were reviewed, revisited and summarized in a report (Lowery and Ingraldi 2006) with the additional locations of roosts identified in Lowery and Ingraldi (2006). We were not aware of any documented bat roosts on BMGR-West during model development.

We imported the geographic coordinates of these features (including caves, crevices and mines) into ArcGIS (version 10.0; Environmental Systems Research Institute, Redlands, California, USA) and related them to datasets describing terrain and landform characteristics (e.g. aspect, slope, landform type, vegetation, elevation, and surface formation; Table 1).

TABLE 1. Datasets related to feature and bat roost locations on military lands in southwestern Arizona, 2011.

DATASET	DATA TYPE	DESCRIPTION
TERRAIN	Elevation, Slope, Aspect	Elevation, slope, aspect: 30 meter raster data layers
LANDFORM	Categorical	USGS Southwest ReGAP 2007
VEGETATION	Categorical	USGS Southwest ReGAP 2007
SURFACE FORMATION	Categorical	Arizona Geological Survey Geological Characteristics dataset

We determined the frequencies of each covariate associated with roost site locations and reclassified each into an ordinal ranking, with values ranging between one and ten. Higher values were associated with a higher frequency of occurrence. Each covariate was assigned an equal influence value and combined using a weighted-overlay analysis (ArcGIS; Spatial Analyst Extension). The final model is a surface dataset with values ranging between (0-10) where ten being the most suitable habitat and zero is the least suitable (Figure 2). We used the

resulting raster dataset as a matrix to direct sampling efforts. This likelihood model described the lands on a scale ranging from three (lowest likelihood) to ten (highest likelihood). We selected high likelihood habitat as having a score of seven or greater (here after high likelihood habitat) direct survey efforts.

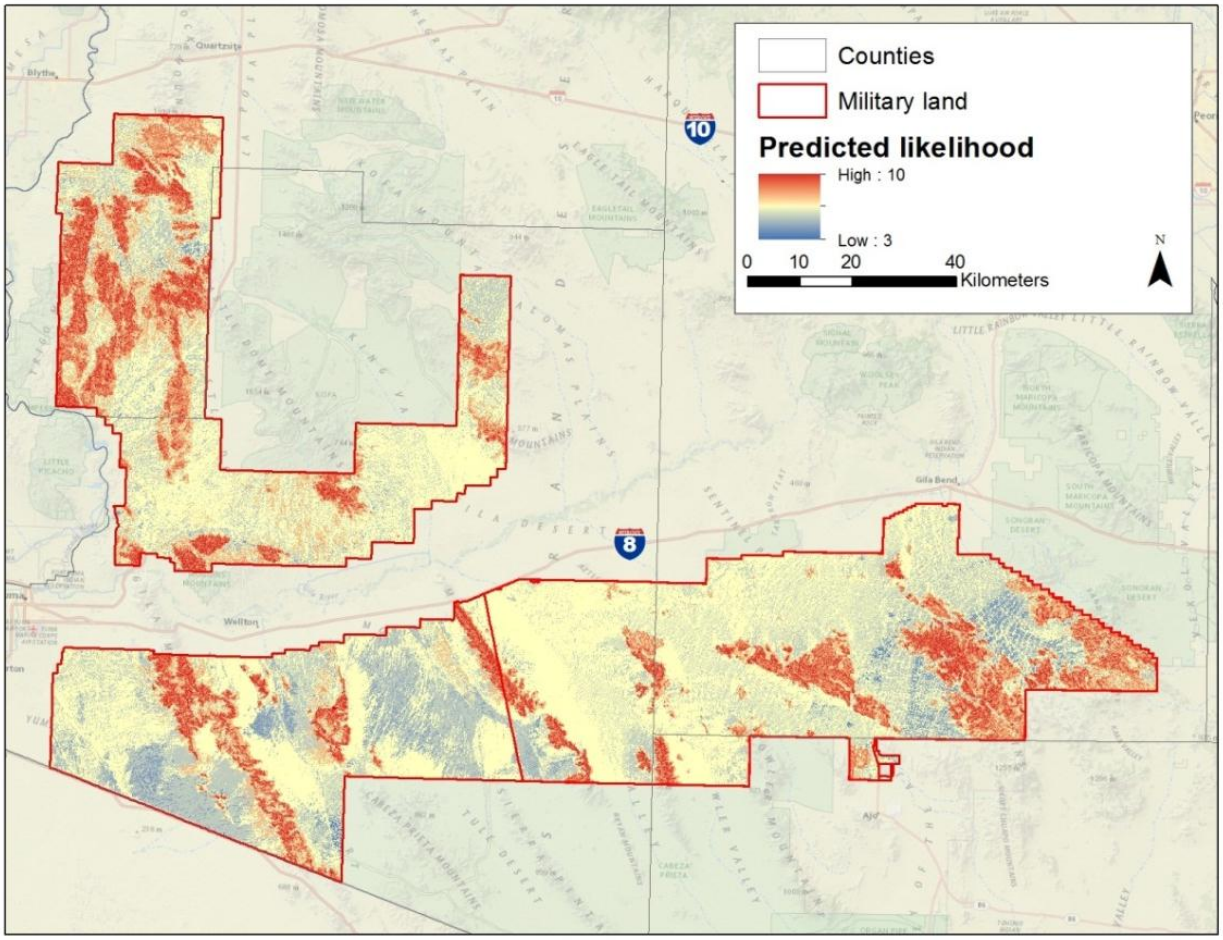


Figure 2. Predicted likelihood of bat roost habitat on military lands in southwestern Arizona, 2011.

Sampling Effort

To maximize survey efforts, we divided the study area into square mile grid cells where two-person crews directed search efforts to locations identified in the habitat suitability model as being most suitable (i.e., ordinal ranking of 8, 9 and 10). We avoided surveying mountain ranges with historical survey efforts to avoid duplicate data and opportunistically surveyed area that ranked lower than 8 in the model likelihood (Figure 2). These ranges covered the (Aguila Mountains and the Souceda Mountains; Appendix B). Observers walked canyon and ridgelines visually scanning adjacent slopes with binoculars and spotting scopes for mine and cave openings. When a roost feature was identified (e.g caves, crevices and mines), surveys inspected them for the physical presence of bats, guano, ceiling staining, and or remaining wings or thorax segments of moths and beetles. Insectivorous guano consists of dark brown pellets; when pulverized, exo-skeletal remains of consumed insects can be identified. Upon finding a potential feature within a survey plot, the following measurements were recorded:

GPS location, portal/collar temperature, internal temperature, portal height and width, and length/depth, bat presence/absence, bat guano present/absent in high, medium or low quantities, general description and photo number(s). Observers also collected ancillary data (brief description and photos) describing the use of features inventoried by raptors and other wildlife.

Mine Surveys

Areas identified as being of the highest predicted suitability (9 and 10), were visited at random throughout the field season. When bats were identified, species were determined when possible and total number of individuals was approximated Mines were located by reviewing United States Geological Survey (USGS) 7½ minute topographic maps, consulting with the YPG personnel, Arizona State mine inspector's (ASMI) data files, and from visual observations. The mines investigated during our survey included adits, shafts, and prospects. The mine site classification system used was based on field experience and symbols found on USGS topographic maps and are as follows:

Adits - horizontal tunnels that vary in length from ten feet to hundreds of feet. These can be straight or with many twists and turns. It is possible to have additional drifts (horizontal passageways) within adits. The USGS topographic symbol is "Y." These features tend to provide good roosting habitat for bats as they provide horizontal structure to cling to.

Shafts - vertical entrances with depths greater than ten feet. These may be straight or declining with varying slopes and may or may not contain drifts. Vertical shafts often cannot be completely surveyed due to safety precautions. The USGS topographical symbol is a half-shaded box. These features typically support lower numbers of bats unless there is a horizontal drift associated with the feature below ground.

Prospects - small, shallow holes or scrapes constructed to prove claims or explore new areas. These are generally small diggings less than 10 feet in depth but may represent larger shafts and adits and all will be surveyed due to this reason. The USGS topographic symbol is "X." These features provide very little habitat value to bats unless they extend underground providing shelter.

Cave Surveys

There are many small caves on the DoD installations surveyed in this project, however, these features are not extensive, typically being less than ten feet in depth. Caves were surveyed in the same manner as mines when located on maps or identified in the field.

RESULTS

We surveyed approximately 95.6 mi^2 across 12 mountain ranges of habitat predicted as high likelihood in supporting bat features from December 2010 to May 2011. We identified 159 features (Table 2, Appendix A) consisting of caves and mines that contained evidence of bat use. Four located features contained active roosting bats. Most bat features (n=147; 85.53%) were associated with modeled likelihood values of 7, 8 and 9 (Table 3).

Table 2. Survey summary for bat features on military managed land in southwestern Arizona, 2011.

Mountain Range	# of Mine features	X of Cave/Crevice Features	# of active bat roosts	Military Land*
Crater Range	2	1	0	BMGR-E
Granite	0	0	0	BMGR-E
Mohawk	4	2	1	BMGR-E
White Hills	0	0	0	BMGR-E
Copper	28	0	0	BMGR-W
Gila	3	0	0	BMGR-W
Mohawk	18	3	2	BMGR-W
Tinajas Altas	0	0	0	BMGR-W
Wellton Hills	11	0	0	BMGR-W
Muggins	5	1	1	YPG
Kofa	1	1	0	YPG
Trigos	69	10	0	YPG

* Military Land designations include: Barry M. Goldwater Range East (BMGR-E), Barry M. Goldwater West (BMGR-W), and Yuma Proving Ground (YPG).

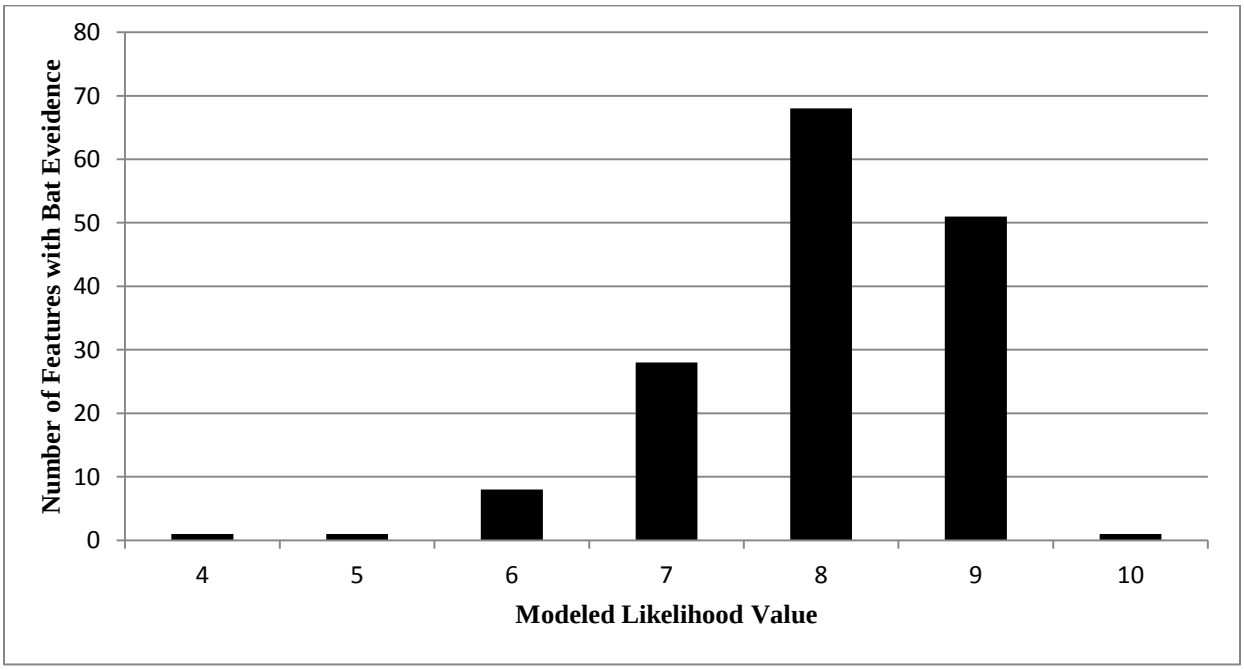


Figure 3. Distribution of features with bat evidence associated to predicted habitat likelihood value, located on military lands in southwestern Arizona, 2011.

Barry M. Goldwater Range- East

We surveyed a total of 49.5 square miles of BMGR-East for bat roost locations. Surveys were intensified on four mountain ranges including the Mohawk and Granite Mountains, Crater Range and the White Hills. A total of nine bat roost sites were identified, including three cave sites and six mine sites in the Mohawk Mountains (Table 2, Figure 4). Other mountain ranges (including the Sand Tank mountains and the northern extent of the Crater Range) with high predicted habitat suitability were not surveyed due to ongoing training activities.

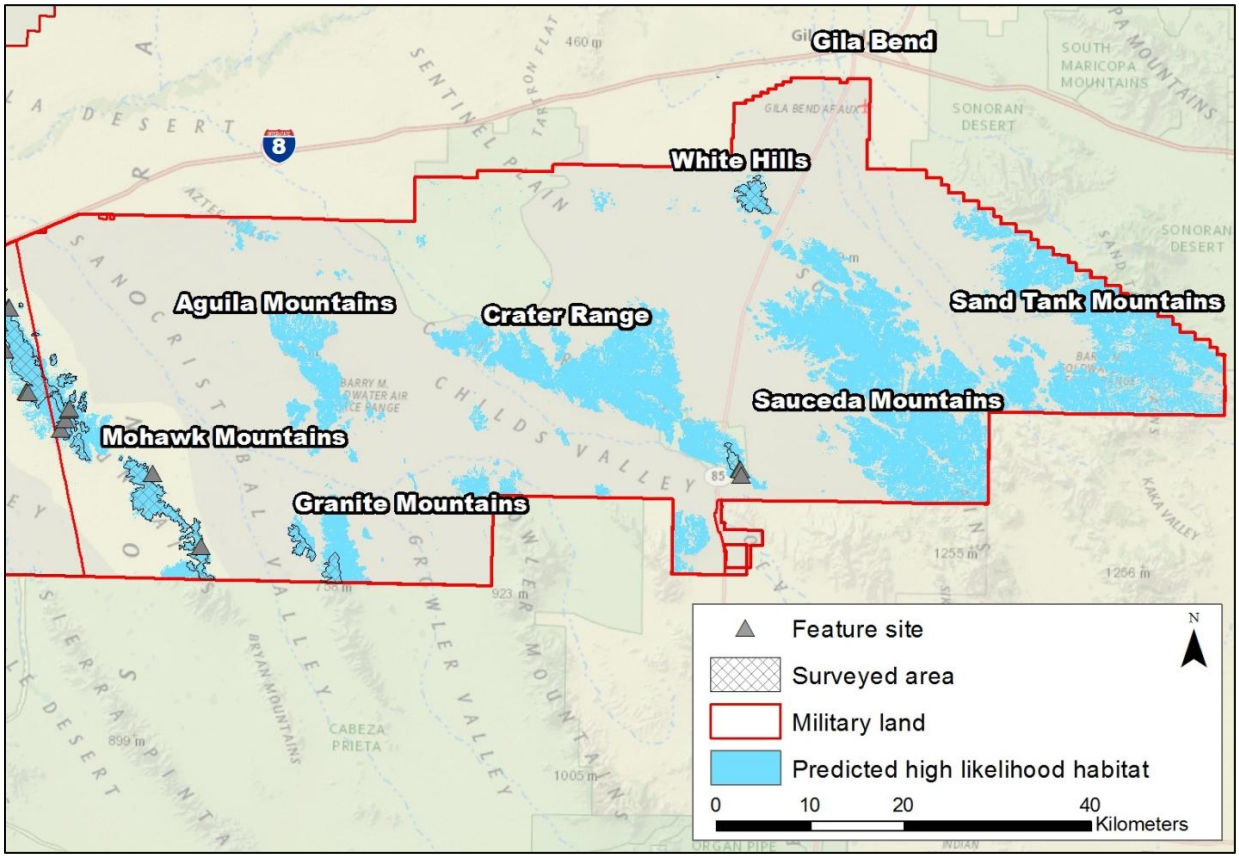


Figure 4. Bat feature survey results for Barry M. Goldwater Range East in southwestern Arizona, 2011.

Barry M. Goldwater Range – West

We surveyed a total of 26.6 square miles of BMGR-West for bat roost locations. Surveys were intensified on five mountain ranges including the Mohawk, Gila and Copper Mountains, Tinajas Altas and the Wellton Hills. A total of 63 roost sites were identified including 60 mines and three caves. All sites were identified as night roosts showing sign or occupation by MACA, two mines had live MACA present. MCAS Yuma (west of the Gila Mountains; Figure 5) was not surveyed as no predicted habitat existed.

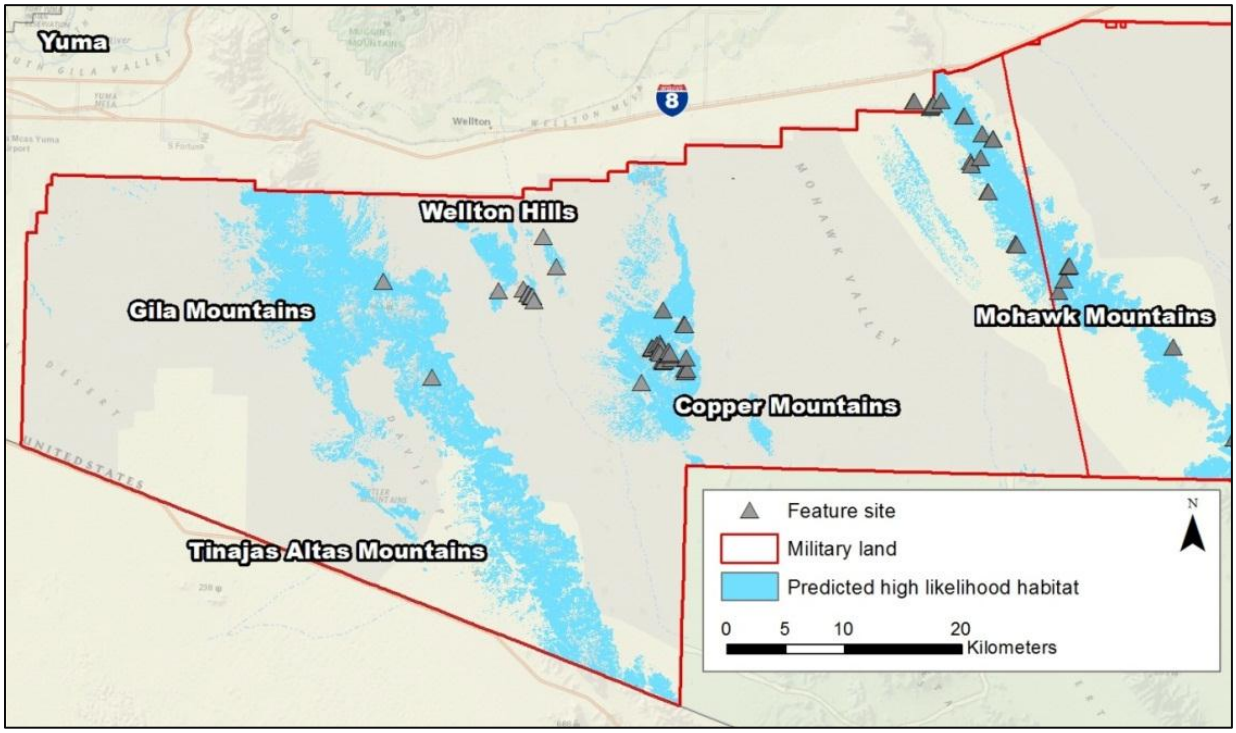


Figure 5. Bat feature survey results for Barry M. Goldwater Range West in southwestern Arizona, 2011.

Yuma Proving Ground

We surveyed a total of 19.5 square miles of YPG for bat roost locations. Surveys were intensified on three mountain ranges including the Trigo, Muggins, and Kofa Mountains. A total of 87 roost sites were identified including 84 night roosts, primarily for *myotis* spp. and a single day roost (cave) for MACA. Other mountain ranges (including the Sawtooth, Chocolate, Middle, and southern portion of the Trigos Mountains) with high predicted habitat suitability were not surveyed due to ongoing training activities.

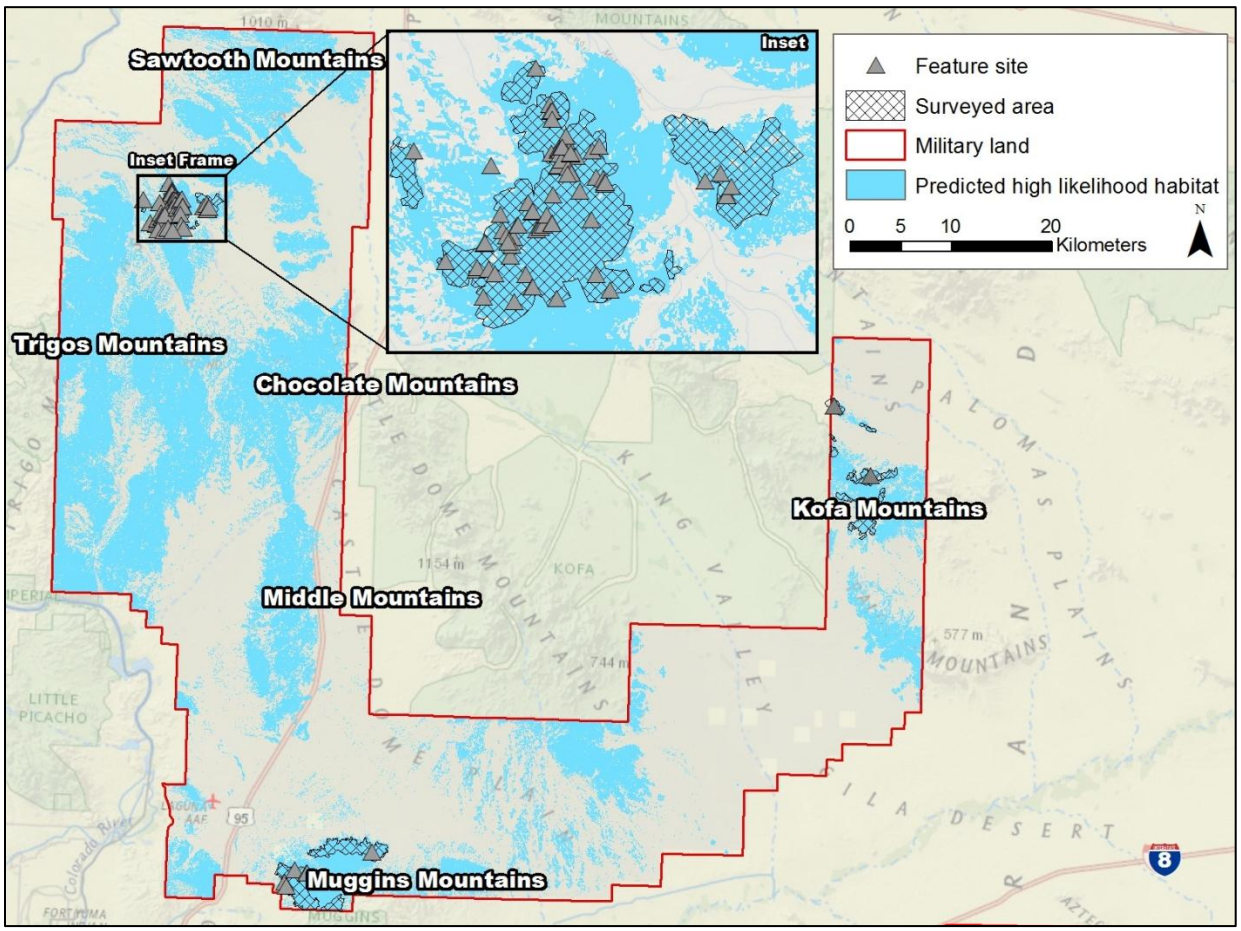


Figure 6. Bat feature survey results for Yuma Proving Grounds in southwestern Arizona, 2011.

We combined historical datasets (Appendix B) used to develop the likelihood model with survey results to provide a comprehensive view of bat roost features (n=355) on military managed lands in southwestern Arizona (Figure 7).

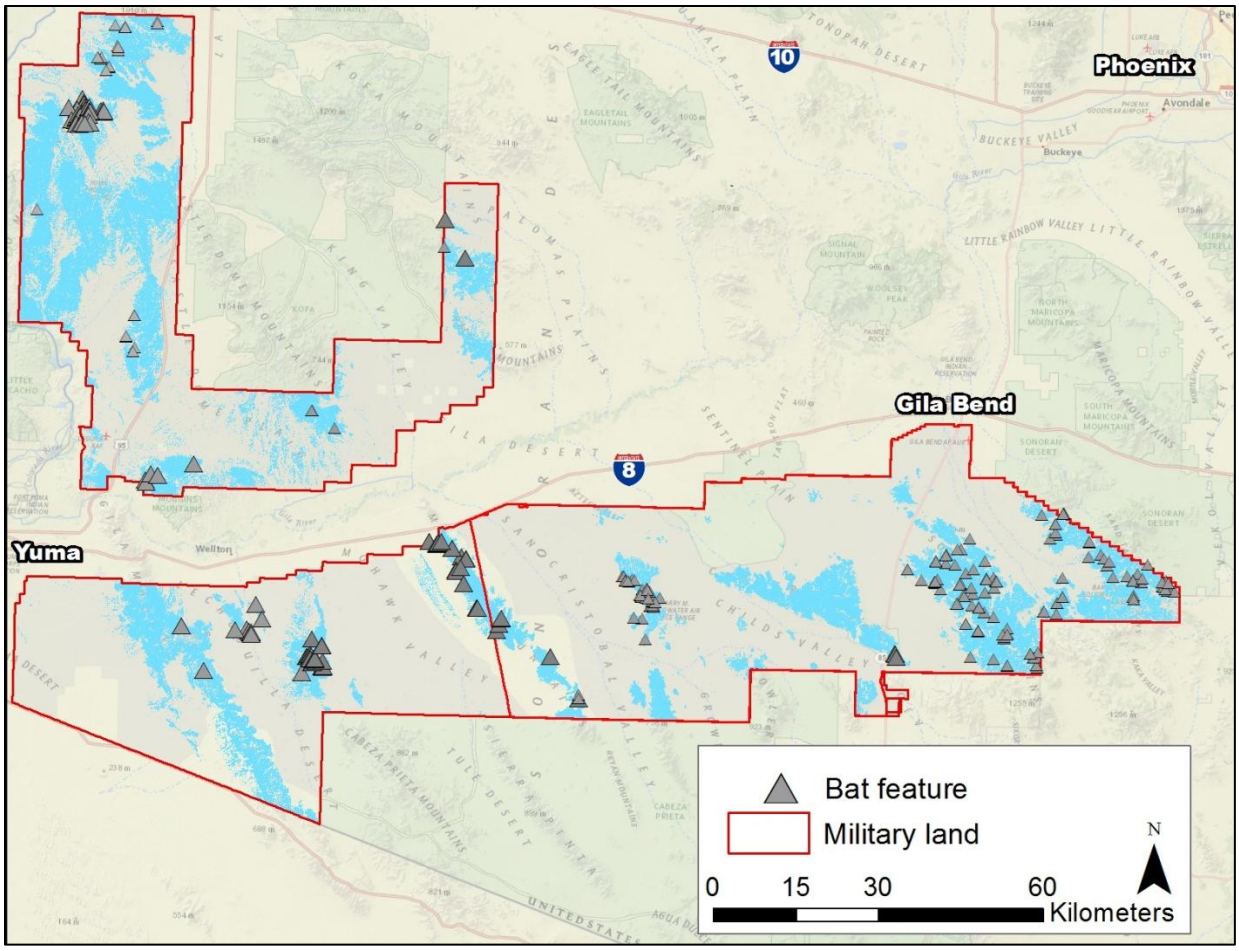


Figure 7. Comprehensive bat feature inventory for military managed land in southwestern Arizona, 2011.

DISCUSSION

The predicted likelihood model was based on even weighting of the input data layers. This ultimately produced an additive model (Figure 2). This additive model may have been simplistic in design and produced a layer describing the number of variables present at a specific location. This may have allowed us to locate features in an efficient manner; however, if fails to address what features are most important to the bats utilizing this landscape. For example, a bat may prefer one specific characteristic over another, especially considering how they may use that feature (e.g., a night roost vs. a day roost). The predictive model in its simplistic design likely over predicts areas of suitable habitat or set of conditions. Further analysis should take place to investigate specific characteristics of these features including micro-climate variables. Although the predictive model may have been over-predictive in terms of suitable habitat, it likely streamlined our survey strategy during the field season.

Using the predictive model, we focused our survey efforts across the study area (Figure 1). We first eliminated areas to survey based on previous survey efforts and access to those military lands. The remaining areas were further refined to include the "best" predicted habitat (i.e., scores of 8, 9 and 10). Although we focused our efforts on this "best" habitat, we also opportunistically surveyed areas of lower scores as available. The results of 159 features with the majority being represented by model scores of 8, 9 and 10 are not surprising. These data are skewed left as an artifact of our survey methodology. What is surprising is that we identified many features in areas scored 6 and 7, which was not the focus of our survey methodology. This suggests that bat may be focusing on features consistent with either a certain combination of model parameters (Table 1). Specific analyses designed to weight these covariates may provide additional insight as to how bats are choosing these features. With this information, this model could be informed with uneven weighting based on the analysis results. This would allow for discrimination of data inputs that bats may favor more or less and more efficient survey strategies to be developed.

Mines and caves are important habitats for many bat species (Tuttle and Taylor 1988). These features are found throughout these three DoD installations and many are occupied by bats. This project identified that at least three different species of bats (California leaf-nose bat, Townsend's big-eared bats, and a variety of *Myotis* spp.) occupy abandoned mines and other roosts on all three installations. With the loss of traditional roosts (e.g., caves) due to disturbance, habitat modification and other factors, mines may become more important habitat features for roosting bats. Our survey efforts highlighted the distribution of roost sites for bats across three DoD lands in southwestern Arizona (Figure 7), and the importance of mine sites for bats on the installations (Table 2).

As many of the mines we surveyed occurred in public areas where they could be hazardous to people including recreational users, the bases may enact programs to close mines. Programs that result in closures intended to safeguard humans can be incompatible with mine-roosting bats and should therefore be carefully considered. One such example is Wellton 1 on BMGR-West. This gate system can prevent human entry (therefore reducing installation liability) while allowing bats to utilize the feature. There are various methods tested for human exclusion and bat roosting habitat compatibility (e.g., bat gates; White and Seginak. 1987), and all developed methods should be scrutinized based on bat activity and species use.

The Department of Defense (DoD) has recently signed two agreements that emphasize the need for the conservation of bat species on DoD lands. The DoD Memorandum of Understanding (MOU) with Bat Conservation International (BCI) establishes a policy of cooperation and coordination to identify, document and maintain bat populations and their habitats on DoD installations. The MOU between DoD and the International Association of Fish and Wildlife Agencies directs the management of natural resources on military installations under provisions of the Sikes Act. The amount of training on BMGR and YPG has increased in recent years, especially in proximity to mines and caves (i.e., potential bat roosts). It is therefore imperative that roost site locations be identified to avoid conflicts between sensitive bat species and military missions. Finally, there are safety issues that must be considered when deploying personnel in training scenarios where they may encounter abandoned mines or caves. Having detailed maps of mine and cave locations within BMGR and YPG could be vital in mission implementation and safety.

MANAGEMENT RECOMMENDATIONS

We recommend these conservation and management guidelines for colonial roosting, mine-dependent bats specific to BMGR and YPG.

- Continue to identify and inventory all mines for bat roosting potential.
- Continue collecting baseline data on bat population trends. Maintain population records and estimates for all bat species, even for "common" bats such as California leaf-nosed bats and cave myotis.
- Continue long-term monitoring at mines, or sets of mines, that harbor significant populations or show significant sign of use (i.e., guano, ceiling stain, insect parts). Evaluate the potential for long-term monitoring using netting, trapping, or acoustic detection at other sites including water features.
- Continue identification, inventory, protection, and enhancement of key roosting, feeding, and drinking resources (natural and man-made) for bats.
- Initiate studies of year-to-year roost site fidelity. Study movement patterns and roost switching for California leaf-nosed bats and Townsend's big-eared bats in Arizona mines and caves.
- Identify foraging areas for bats near key roost sites through radio-telemetry and/or acoustic monitoring. If a roost is protected, but the critical foraging habitat is not effectively managed, the bats may still decline in numbers.
- Monitor key flight and migratory corridors including forage resources by establishing survey routes within these areas.
- Concentrate training activities away from key roost, forage, and drinking areas and evaluate potential impacts to bats when developing new training areas. Compliance with NEPA requires surveys as new projects are proposed. This approach should reduce disturbance to ecologically important areas for bats and other species while reducing overall fragmentation of wildlife habitat.

- Monitor the effectiveness of management actions implemented for bat conservation, including bat gates, manmade roosts, and other restoration and protection projects.
- Install bat-compatible gates to prevent unauthorized human entry and disturbance at key roost sites such as Wellton 1 (Appendix A).

LITERATURE CITED

Anthony, E.L. P, M. H. Stack and T. H. Kunz. 1981. Night roosting and the nocturnal time budget of the little brown bat, *Myotis lucifigus*: effects of reproductive status, prey density and environmental conditions. Oecologia 51: 151-156

Brown, D. E. (ed.) 1994. Biotic Communities: Southwestern United States and Northwestern Mexico, University of Utah Press, Salt Lake City, Utah.

Dalton, D.C. and V.M. Dalton. 1994. Mine/Bat Survey: Eastern and Western sections, Barry M. Goldwater Air Force Range. Contract No. DACA65-92-M-1138. Report to Luke Air Force Natural Rec. Prog.

Dames and Moore. 1996. Sensitive species surveys on Barry M. Goldwater Range. Prepared for 56 CES/CEVN, Luke AFB. December 1996

Dobkin, D.S., R.D. Gettinger, and M.G. Gerdes. 1995. Springtime movements, roost use and foraging activity of Townsend's Big-Eared Bat (*Plecotus townsendii*) in Central Oregon. Great Basin Naturalist 55(4):315-321

Humphrey, S.R. 1975. Nursery roosts and community diversity of Nearctic bats. Journal of Mammalogy 56:321-346.

Johnson, S.A., V. Brock, and R.E. Rolley. 1998. Overwinter weight loss of Indiana bats (*Myotis sodalis*) from hibernacula subject to human visitation. American Midland Naturalist 139:255-261.

Kerth, G., K. Weissmann, and B. Konig. 2001. Day roost selection in female Bechstein's bats (*Myotis bechsteinii*) a field experiment to determine the influence of roost temperature. Oecologia 126:1-9.

Kuenzi, A.J., G.T. Downard, and M.L. Morrison. 1999. Bat distribution and hibernacula use in west central Nevada. Great Basin Naturalist 59:213-220.

Lacki, M.J., M.D. Adam, and L.B. Shoemaker. 1994. Observations on seasonal cycle, population patterns and roost selection in summer colonies of (*Corynorhinus townsendii virginus*) in Kentucky. American Midland Naturalist 131:34-42.

Lowery, S. F. and M.F. Ingraldi. 2006. Lesser long-nosed bat roost identification surveys within Barry M. Goldwater Range- United States Air Force. Prepared for 56 RMO/ESMN Luke AFB. Maricopa County, Arizona. December 2005.

Raesly, R.L. and J.E. Gates. 1986. Winter habitat selection by North temperate cave bats. American Midland Naturalist 118(1):15-31

Sherwin, R.E, D. Stricklan, and D.S. Rogers. 2000. Roosting affinities of Townsend's Big-eared Bat (*Corynorhinus townsendii*) in northern Utah. Journal of Mammalogy 81(4):939-947.

Schull, A. M. 1988. Endangered and threatened wildlife and plants; determination of endangered status for two long-nosed bat. Fed. Register 53(190): 38456-3860.

Sidner, R. and R. Davis. 1988. Records of nectar feeding bats in Arizona. Southwestern Naturalist 33: 493-495.

Tuttle, M.D. and D.A.R. Taylor. 1998. Bats and mines. Resource Publication No. 3. Bat Conservation International, Austin, 52 pp.

Twente, J. W. Jr. 1955. Some aspects of habitat selection and other behavior of cavern-dwelling bats. Ecology 36(4):706-732.

USFWS (U.S. Fish and Wildlife Service. 1995. Lesser long-nosed bat recovery plan. U.S. Fish and Wildlife Services, Albuquerque, NM. 45pp.

White, D.H. and J.T. Seginak. 1987. Cave gate designs for use in protecting endangered bats. Wildlife Society Bulletin, 15: 445–449.

Appendix A. Bat feature inventory across the Barry M. Goldwater Range and Yuma Proving Ground, Arizona 2011.
† = geographic location is recorded in WGS 84 datum, UTM, zone 12 N
‡ = geographic location is recorded in WGS 84 datum, UTM, zone 11 N

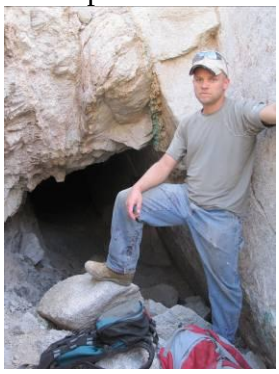
We recorded each feature with United States Geological Survey quadrant, GPS location, observation date, observer, feature type, evidence, description, and photo (if available). Many of these photo images were not available to do equipment malfunction primarily due to battery and storage related issues. Descriptions include field notes collected by the observer upon visiting that feature. Below are the details of each feature documented during the field season.

Roost Site: Mohawk 1
Quad: Mohawk SW
Location†: 218583 E, 3600730 N
Dates Observed: 1/25/11
Observers: J. Ernst
Type: Mine
Evidence: Guano, no bats observed
Description: Feature is an 80 ft adit with 50 ft winze at rear of feature.
Notes: Many scattered pieces of guano throughout mine feature.

Roost Site: Mohawk 2
Quad: Mohawk SW
Location†: 218648 E, 3600693 N
Dates Observed: 1/25/11
Observers: J. Ernst
Feature Type: Mine
Evidence: scattered guano
Description: Located mine adit with winze at entrance, unable to search entire feature.

Roost Site: Mohawk 3
Quad: Mohawk SW
Location†: 218651 E, 3600672 N
Dates Observed: 1/17/2011
Observers: C. Bertrand
Feature Type: Mine
Evidence: Scattered guano, no bats observed
Description: Mine adit approximately 300 ft deep with scattered guano.

Roost Site: Mohawk 4
Quad: Mohawk SW
Location†: 219054 E, 3600960 N
Dates Observed: 1/25/2011
Observers: W. Carroll
Type: Mine
Evidence: scattered guano
Description: Mine adit approximately 9m deep with scattered guano, NW aspect.



Roost Site: Mohawk 5
Quad: Mohawk SW
Location†: 219157 E, 3600401 N
Dates Observed: 1/27/2011
Observers: J. Ernst
Type: Mine
Evidence: scattered guano
Description: Mine approximately 100 ft deep with scattered guano, SE aspect.

Roost Site: Mohawk 6
Quad: Mohawk SW
Location†: 219270 E, 3600655 N
Dates Observed: 1/25/2011
Observers: W. Carroll
Type: Mine
Evidence: scattered guano
Description: Mine adit approximately 15 ft deep with scattered guano, N aspect.

Roost Site: Mohawk 7
Quad: Mohawk SW
Location†: 219275 E, 3601107 N
Dates Observed: 1/25/2011
Observers: J. Ernst
Type: Mine
Evidence: scattered guano
Description: Mine approximately 20 ft deep with scattered guano, SE aspect.

Roost Site: Mohawk 8
Quad: Mohawk SW
Location†: 219319 E, 3600883 N
Dates Observed: 1/25/2011
Observers: J. Ernst
Type: Mine
Evidence: scattered guano
Description: Mine adit approximately 30m deep with scattered guano, NW aspect.


Roost Site: Mohawk 9
Quad: Mohawk SW
Location†: 219549 E, 3603914 N
Dates Observed: 1/17/2011
Observers: J. Ernst
Type: Mine
Evidence: piled guano, insect parts
Description: Mine adit splits into 3 at approximately 35 ft; 3 piles of guano, SW aspect.




Roost Site: Mohawk 10
Quad: Buck Peak
Location†: 219561 E, 3599558 N
Dates Observed: 1/26/2011
Observers: J. Ernst
Type: Mine
Evidence: scattered guano
Description: Mine adit approximately 10m deep with 3 drifts and 1 shaft; scattered guano, SE aspect.

Roost Site: Mohawk 11
Quad: Buck Peak
Location†: 219653 E, 3599579 N
Dates Observed: 1/26/2011
Type: Mine
Evidence: piled guano
Description: Mine adit approximately 450 ft deep with 15 piles of guano, NE aspect. Shaft at back at least 60 ft deep, 3 drifts.



Roost Site: Mohawk 12
Quad: Mohawk SW
Location†: 220006 E, 3600393 N
Dates Observed: 1/27/2011
Observers: W. Carroll
Type: Mine
Evidence: piled guano
Description: Mine shaft, gated; depth unknown; 5 piles of guano, S aspect.

Roost Site: Mohawk 13
Quad: Mohawk SW
Location†: 220021 E, 3600436 N
Dates Observed: 1/27/2011
Observers: J. Ernst
Type: Mine
Evidence: scattered guano
Description: Mine, gated; depth unknown; scattered guano, SE aspect.

Roost Site: Mohawk 14
Quad: Mohawk SW
Location†: 220074 E, 3600154 N
Dates Observed: 1/27/2011
Observers: W. Carroll
Type: Mine
Evidence: scattered guano
Description: Mine adit approximately 30 ft deep with scattered guano, SE aspect.

Roost Site: Mohawk 15
Quad: Mohawk SW
Location†: 220134 E, 3600258 N
Dates Observed: 1/27/2011
Observers: W. Carroll
Type: Mine
Evidence: scattered guano
Description: Mine adit approximately 1m deep with scattered guano, NE aspect.

Roost Site: Mohawk 16
Quad: Mohawk SW
Location†: 220290 E, 3599837 N
Dates Observed: 1/26/2011
Observers: J. Ernst
Type: Mine
Evidence: scattered guano
Description: Mine adit approximately 40 ft deep with scattered guano, NW aspect. Notes: Adjacent to Betty Lee Tank.

Roost Site: Mohawk 17
Quad: Mohawk SW
Location†: 221345 E, 3602749 N
Dates Observed: 1/27/2011
Observers: J. Ernst
Type: Mine
Evidence: scattered guano
Description: Mine adit approximately 35 ft deep with scattered guano, S aspect.

Roost Site: Mohawk 18
Quad: Mohawk SW
Location†: 221354 E, 3602721 N
Dates Observed: 1/27/2011
Observers: J. Ernst
Type: Mine
Evidence: piled guano
Description: Mine adit, gated; depth unknown; 1 pile of guano, S aspect.

Roost Site: Mohawk 19
Quad: Buck Peak
Location†: 221480 E, 3598706 N
Dates Observed: 1/17/2011
Observers: W. Carroll
Type: Mine
Evidence: scattered guano
Description: Mine approximately 50 ft deep, scattered guano, N aspect.

Roost Site: Mohawk 20
Quad: Mohawk SW
Location†: 221485 E, 3599839 N
Dates Observed: 1/26/2011
Observers: W. Carroll
Type: Mine
Evidence: scattered guano
Description: Mine adit approximately 3m deep, scattered guano, N aspect.

Roost Site: Mohawk 21
Quad: Mohawk
Location†: 240844 E, 3621683 N
Dates Observed: 4/5/2011
Observers: J. Miller
Type: Cave
Evidence: scattered guano
Description: Cave approximately 4m deep, scattered guano, NW aspect. Cave inclined.

Roost Site: Mohawk 22
Quad: Mohawk
Location†: 240855 E, 3621676 N
Dates Observed: 4/5/2011
Observers: J. Miller
Type: Cave
Evidence: piled guano
Description: Cave approximately 6 ft deep, 1 pile of guano, NW aspect. Cave inclined.

Roost Site: Mohawk 23
Quad: Mohawk Mtns NW
Location†: 242279 E, 3621140 N
Dates Observed: 4/5/2011
Observers: H. Hoffman
Type: Cave
Evidence: scattered guano
Description: Cave approximately 2m deep and 10m wide, scattered guano, E aspect.


Roost Site: Mohawk 24
Quad: Mohawk Mtns NW
Location†: 242336 E, 3621291 N
Dates Observed: 4/5/2011
Observers: C. Bertrand
Type: Cave
Evidence: scattered guano
Cave approximately 5 ft deep, scattered guano, NW aspect.

Roost Site: Mohawk 25
Quad: Mohawk Mtns NW
Location†: 242515 E, 3621393 N
Dates Observed: 4/5/2011
Observers: W. Carroll
Type: Cave
Evidence: scattered guano
Description: Cave approximately 10 ft deep, scattered guano, NE aspect.

Roost Site: Mohawk 26
Quad: Mohawk Mtns NW
Location†: 242533 mE, 3621378 mN
Dates Observed: 4/5/2011
Observers: W. Carroll
Type: Crevice
Evidence: scattered guano
Description: Crevice approximately 6 ft deep, scattered guano, N aspect.

Roost Site: Mohawk 27
Quad: Mohawk Mtns NW
Location†: 243174 E, 3621714 N
Dates Observed: 4/6/2011
Observers: H. Hoffman
Type: Cave
Evidence: scattered guano
Description: Cave approximately 4m deep, scattered guano, W aspect.



Roost Site: Mohawk 28
Quad: Mohawk Mtns NW
Location†: 245120 E, 3620405 N
Dates Observed: 2/12/2011
Observers: W. Carroll
Type: Cave
Evidence: scattered guano
Cave approximately 15 ft deep, scattered guano, NW aspect. Small cave at rear, unable to fully evaluate, scattered guano.

Roost Site: Mohawk 29
Quad: Mohawk Mtns NW
Location†: 245128 E, 3620406 N
Dates Observed: 2/12/2011
Observers: W. Carroll
Type: Cave
Evidence: scattered guano
Description: Cave approximately 20 ft deep, scattered guano, NW aspect.

Roost Site: Mohawk 30
Quad: Mohawk Mtns NW
Location†: 245703 E, 3616566 N
Dates Observed: 4/7/2011
Observers: W. Carroll
Type: Mine
Evidence: scattered guano
Description: Mine adit approximately 60 ft deep, scattered guano, W aspect. Deer bones present.

Roost Site: Mohawk 31
Quad: Mohawk Mtns NW
Location†: 245745 E, 3616260 N
Dates Observed: 4/7/2011
Observers: J. Ernst
Type: Cave
Evidence: scattered guano
Description: Cave approximately 10 ftdeep, 1 pile of guano, NW aspect.

Roost Site: Mohawk 32
Quad: Mohawk Mtns NW
Location†: 246552 E, 3616898 N
Dates Observed: 4/8/2011
Observers: C. Bertrand
Type: Mine
Evidence: piled guano
Description: Mine adit approximately 450 ft deep, 1 pile of guano, NW aspect. Shaft 250 ft from entrance, depth unknown. Approximately 20 *M. californicus* present.

Roost Site: Mohawk 33
Quad: Mohawk Mtns NW
Location†: 246677 E, 3618894 N
Dates Observed: 2/11/2011
Observers: C. Bertrand
Type: Mine
Evidence: piled guano, insect parts
Description: Mine adit approximately 40 ft deep, 5 piles of guano, E aspect.

Roost Site: Mohawk 34
Quad: Mohawk Mtns NW
Location†: 247139 E, 3614009 N
Dates Observed: 4/8/2011
Observers: W. Carroll
Type: Cave
Evidence: scattered guano
Description: Cave approximately 20 ft deep, scattered guano, NW aspect. May be exit for "Mohawk 35".

Roost Site: Mohawk 35
Quad: Mohawk Mtns NW
Location†: 247163 E, 3614012 N
Dates Observed: 4/8/2011
Observers: J. Miller
Type: Cave
Evidence: piled guano
Description: Cave at least 20 ft deep, steep incline at back to adjoining, inaccessible cave; 3 piles of guano, SW aspect. At least 2 *M. californicus* present.



Roost Site: Mohawk 36
Quad: Mohawk Mtns NW
Location†: 247604 E, 3618460 N
Dates Observed: 2/11/2011
Observers: J. Ernst
Type: Mine
Evidence: piled guano
Description: Mine adit 40 ft deep, 1 pile of guano covering mine floor, E aspect.

Roost Site: Mohawk 37
Quad: Mohawk Mtns SW
Location: 249492 E, 3609611 N
Dates Observed: 4/8/2011
Observers: C. Bertrand
Type: Cave
Evidence: scattered guano
Description: Cave 20 ft deep, scattered guano, SW aspect.

Roost Site: Mohawk 38
Quad: Mohawk Mtns SW
Location†: 249497 E, 3609551 N
Dates Observed: 4/8/2011
Observers: C. Bertrand
Type: Crevice
Evidence: scattered guano
Description: Crevice 30 ft deep, scattered guano, W aspect.

Roost Site: Mohawk 39
Quad: Mohawk Mtns SW
Location†: 249639 E, 3609451 N
Dates Observed: 4/8/2011
Observers: C. Bertrand
Type: Cave
Evidence: piled guano
Cave 30 f deep, 1 pile of guano, W aspect.

Roost Site: Mohawk 40
Quad: Mohawk Mtns SW
Location†: 253138 E, 3605501 N
Dates Observed: 1/28/2011
Observers: C. Bertrand
Type: Crevice
Evidence: scattered guano
Description: Crevice 20 ft deep, scattered guano, SW aspect. Great-horned owl roost at entrance.

Roost Site: Mohawk 41
Quad: Mohawk Mtns SE
Location†: 253642 E, 3606531 N
Dates Observed: 4/9/2011
Observers: W. Carroll
Type: Cave
Evidence: piled guano
Description: Cave 30 ft deep, 4 piles of guano, SE aspect. Opening to large chamber at rear of cave.

Roost Site: Mohawk 42
Quad: Mohawk Mtns SE
Location†: 253959 E, 3607603 N
Dates Observed: 5/8/2011
Observers: C. Bertrand
Type: Cave
Evidence: scattered guano
Description: Cave 50 ft deep, scattered guano, SE aspect. Pack rat midden covering cave floor.

Roost Site: Mohawk 43
Quad: Mohawk Mtns SE
Location†: 254060 E, 3607708 N
Dates Observed: 5/8/2011
Observers: W. Carroll
Type: Cave
Evidence: piled guano
Description: Cave 70 ft deep, 1 pile of guano, S aspect.

Roost Site: Mohawk 44
Quad: Mohawk Mtns SE
Location†: 262913 E, 3600764 N
Dates Observed: 3/8/2011
Observers: H. Hoffman
Type: Cave
Evidence: scattered guano
Description: Cave 15 ft deep, scattered guano, NE aspect. Whitewash.


Roost Site: Mohawk 45
Quad: Monreal Well
Location†: 268090 E, 3593043 N
Dates Observed: 3/9/2011
Observers: J. Ernst
Type: Mine
Evidence: piled guano
Description: Mine adit 130 ft deep, 4 piles of guano, W aspect. At least 30 *M. californicus* and adit drops at 40 ft.

Roost Site: Mohawk 45…continued

Roost Site: Crater Range 1
Quad: Deadman Gap
Location†: 325656 E, 3601289 N
Dates Observed: 3/9/2011
Observers: C. Bertrand
Type: Crevice
Evidence: scattered guano
Description: Crevice 15 ft deep, scattered guano, NW aspect. Owl roost with bones and pellets.

Roost Site: Crater Range 2
Quad: Deadman Gap
Location†: 325756 E, 3601186 N
Dates Observed: 3/9/2011
Observers: C. Bertrand
Type: Crevice
Evidence: scattered guano
Description: Crevice 5 ft deep, scattered guano, SE aspect.

Roost Site: Tank 1
Quad: Palamos Mtns NW
Location†: 243876 E, 3680124 N
Dates Observed: 4/10/2011
Observers: W. Carroll
Type: Cave
Evidence: scattered guano
Description: Cave approximately 10 ft deep, scattered guano, E aspect.

Roost Site: Tank 2
Quad: Palomas Mtns NW
Location[†]: 247489 E, 3673193 N
Dates Observed: 4/10/2011
Observers: C. Bertrand
Type: Cave
Evidence: piled guano
Description: Cave approximately 30 ft deep, 2 piles of guano, W aspect. Incline at rear.

Roost Site: Trigo 1
Quad: North Trigo Peaks
Location[‡]: 733326 E, 3697925 N
Dates Observed: 12/6/2010
Observers: J. Ernst
Type: Cave
Evidence: scattered guano
Description: Cave 3 ft deep, scattered guano, NE aspect. 3 ft off wash floor.

Roost Site: Trigo 2
Quad: North Trigo Peaks
Location[‡]: 734111 E, 3695709 N
Dates Observed: 12/6/2010
Observers: C. Bertrand
Type: Cave
Evidence: piled guano, insects
Description: Cave 10 ft deep, 1 pile of guano, SW aspect. 1 5 ft off wash floor, pool present.

Roost Site: Trigo 3
Quad: Mohave Peak
Location‡: 734738 E, 3695570 N
Dates Observed: 12/6/2010
Observers: H. Hoffman
Type: Cave
Evidence: scattered guano
Description: Cave 3 ft deep, scattered guano, SW aspect.


Roost Site: Trigo 4
Quad: Mohave Peak
Location‡: 734758 E, 3695625 N
Dates Observed: 12/6/2010
Observers: H. Hoffman
Type: Cave
Evidence: scattered guano
Description: Cave 5 ft deep, 4 pieces scattered guano, SW aspect.


Roost Site: Trigo 5
Quad: North Trigo Peaks
Location‡: 734876 E, 3696117 N
Dates Observed: 12/18/2010
Observers: C. Bertrand
Type: Cave
Evidence: scattered guano
Description: Cave 6 ft deep, scattered guano, SW aspect. Sheep scat and whitewash present.



Roost Site: Trigo 6
Quad: North Trigo Peaks
Location‡: 734882 E, 3696129 N
Dates Observed: 12/18/2010
Observers: J. Ernst
Type: Cave
Evidence: scattered guano
Description: Cave 3 ft deep, scattered guano, NW aspect.

Roost Site: Trigo 7
Quad: North Trigo Peaks
Location‡: 734922 E, 3697714 N
Dates Observed: 12/5/2010
Observers: J. Ernst
Type: Cave
Evidence: scattered guano
Description: Cave 80 ft deep, scattered guano, E aspect. Midden.

Roost Site: Trigo 8
Quad: Mohave Peak
Location‡: 734923 E, 3695037 N
Dates Observed: 12/19/2010
Observers: H. Hoffman
Type: Cave
Evidence: scattered guano
Description: Cave 6 ft deep, scattered guano, SW aspect.

Roost Site: Trigo 9
Quad: Mohave Peak
Location‡: 735002 E, 3695606 N
Dates Observed: 12/17/2010
Observers: H. Hoffman
Type: Crevice
Evidence: scattered guano
Description: Crevice 5 ft deep, scattered guano, S aspect.



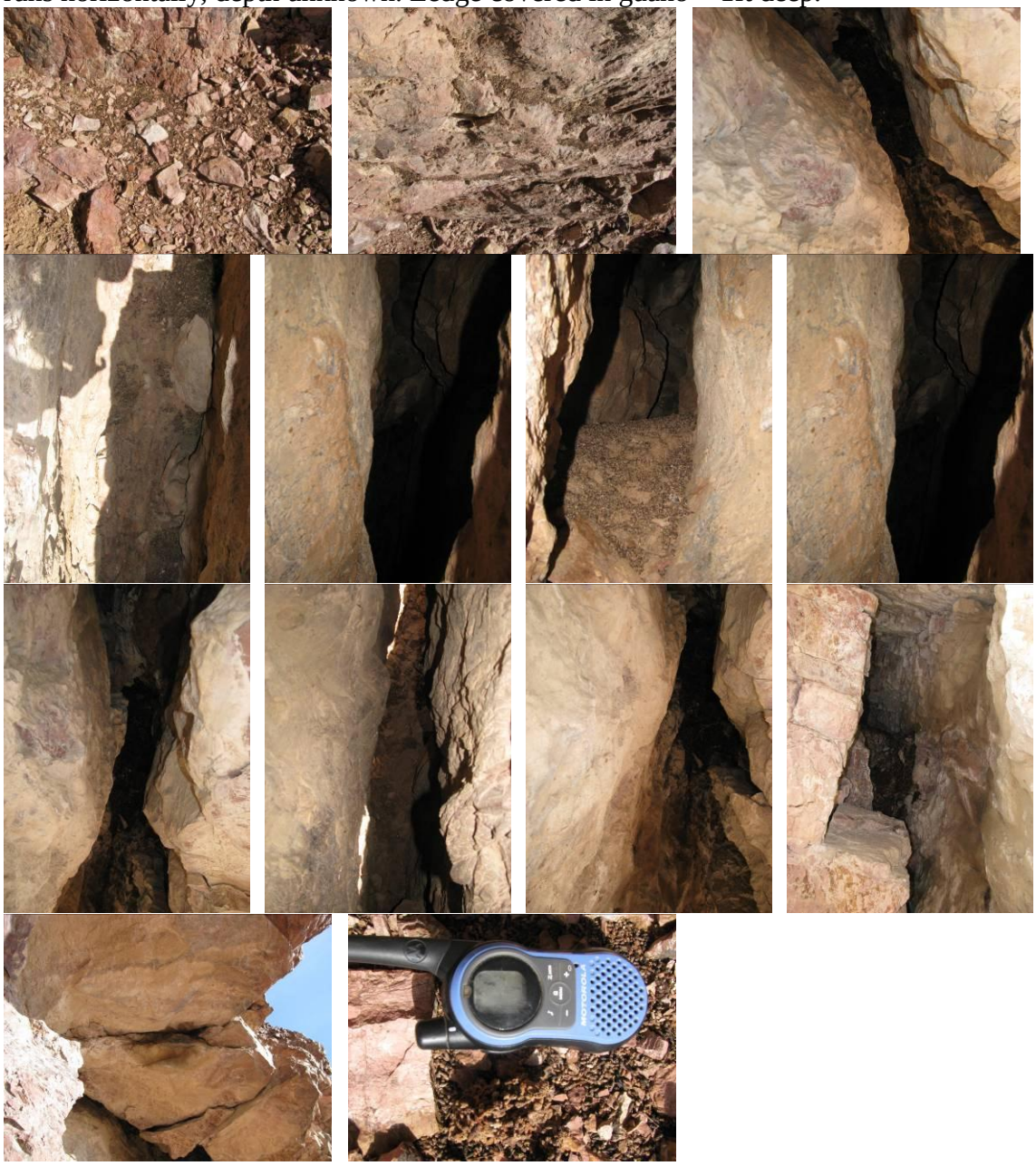
Roost Site: Trigo 10
Quad: Mohave Peak
Location‡: 735131 E, 3695510 N
Dates Observed: 12/17/2010
Observers: J. Ernst
Type: Cave
Evidence: scattered guano
Description: Cave 6 ft deep, scattered guano, NE aspect.

Roost Site: Trigo 11
Quad: North Trigo Peaks
Location‡: 735166 E, 3696728 N
Dates Observed: 12/18/2010
Observers: J. Ernst
Type: Cave
Evidence: scattered guano
Description: Cave 6 ft deep, scattered guano, NE aspect.

Roost Site: Trigo 12
Quad: North Trigo Peaks
Location‡: 735233 E, 3696407 N
Dates Observed: 12/18/2010
Observers: J. Ernst
Type: Cave
Evidence: piled guano
Description: Cave 6 ft deep, 1 pile of guano, 150 pieces; N aspect.


Roost Site: Trigo 13
Quad: North Trigo Peaks
Location‡: 735313 E, 3696294 N
Dates Observed: 12/18/2010
Observers: J. Ernst
Type: Cave
Evidence: scattered guano
Description: Cave 6ft deep, scattered guano, 15-20 pieces; N aspect.

Roost Site: Trigo 14
Quad: North Trigo Peaks
Location‡: 735361 E, 3696180 N
Dates Observed: 12/18/2010
Observers: H. Hoffman
Type: Crevice
Evidence: piled guano
Description: Crevice 10 ft deep, 2 large piles of guano, SW aspect. 10 ft above ground crevice runs horizontally, depth unknown. Ledge covered in guano > 1ft deep.



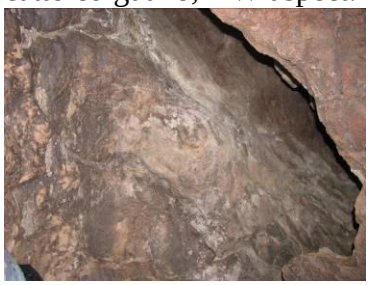
Roost Site: Trigo 15
Quad: North Trigo Peaks
Location‡: 735421 E, 3695892 N
Dates Observed: 12/17/2010
Observers: J. Ernst
Type: Cave
Evidence: scattered guano
Description: Cave 5 ft deep, scattered guano, N aspect.

Roost Site: Trigo 16
Quad: North Trigo Peaks
Location‡: 735442 E, 3696115 N
Dates Observed: 12/17/2010
Observers: J. Ernst
Type: Cave
Evidence: scattered guano
Description: Cave 10 ft deep, scattered guano, SW aspect.

Roost Site: Trigo 17
Quad: North Trigo Peaks
Location‡: 735461 E, 3696275 N
Dates Observed: 12/5/2010
Observers: H. Hoffman
Type: Crevice
Evidence: scattered guano
Description: Crevice 10 ft deep, scattered guano, W facing. Roost over midden.



Roost Site: Trigo 18
Quad: North Trigo Peaks
Location‡: 735524 E, 3696537 N
Dates Observed: 12/18/2010
Observers: H. Hoffman
Type: Cave
Evidence: scattered guano
Description: Cave 3 ft deep, scattered guano, NW aspect.

Roost Site: Trigo 19
Quad: North Trigo Peaks
Location‡: 735544 E, 3696528 N
Dates Observed: 12/18/2010
Observers: H. Hoffman
Type: Cave
Evidence: scattered guano
Description: Cave 5 ft deep, scattered guano, NE aspect.


Roost Site: Trigo 20
Quad: Mohave Peak
Location‡: 735544 E, 3694980 N
Dates Observed: 12/19/2010
Observers: H. Hoffman
Type: Cave
Evidence: scattered guano
Description: Cave 50 ft deep, scattered guano, NE aspect. Whitewash.

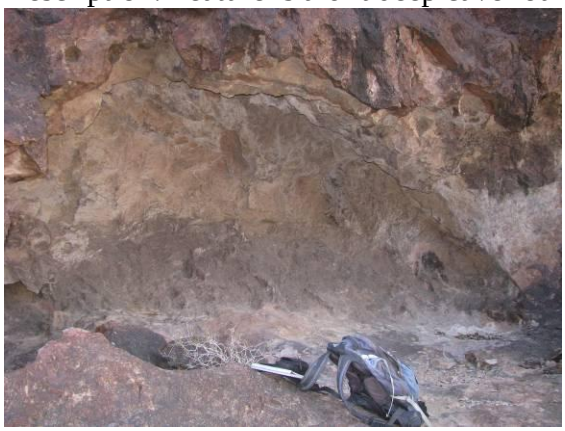
Roost Site: Trigo 21
Quad: North Trigo Peaks
UTMs (WGS 84): 735713 mE, 3699740 mN
Dates Observed: 12/2/2010
Observers: J. Ernst
Type: Mine
Evidence: insect parts
Description: Mine adit 10 ft deep, insect parts only, E aspect.


Roost Site: Trigo 22
Quad: North Trigo Peaks, AZ
Location‡: 735722 E, 3697006 N
Dates Observed: 12/5/2010
Observers: H. Hoffman
Feature Type; Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a 10 ft deep cave with 6 ft^2 of scattered guano.

Roost Site: Trigo 23
Quad: Mohave Peak,
Location‡: 735758 E, 3695546 N
Dates Observed: 12/17/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Around 50 pieces of guano were scattered around the feature. A 1ft x 1ft recess was found in cave.

Roost Site: Trigo 24
Quad: North Trigo Peaks
Location‡: 735807 E, 3696823 N
Dates Observed: 12/5/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Scattered guano found throughout 10 ft deep cave.

Roost Site: Trigo 25
Quad: North Trigo Peaks
Location‡: 735816 E, 3696827 N
Dates Observed: 12/5/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a 6 ft deep cave found with scattered guano.



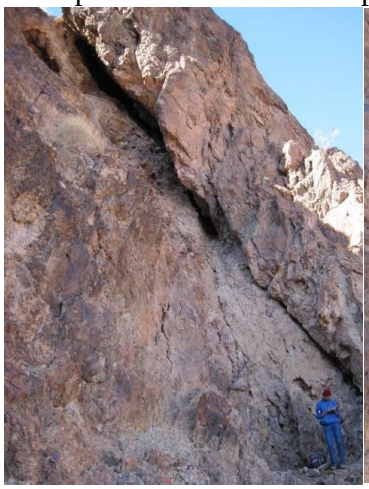
Roost Site: Trigo 26
Quad: Mohave Peak
Location‡: 735895 E, 3695294 N
Dates Observed: 1/5/2011
Observers: H. Hoffman
Feature Type: Crevice
Evidence: Scattered guano, no bats observed
Description: 6 ft deep crevice with scattered guano.

Roost Site: Trigo 27
Quad: Mohave Peak
Location‡: 735904 E, 3695297 N
Dates Observed: 1/5/2011
Observers: H. Hoffman
Feature Type: Crevice
Evidence: Scattered guano, no bats observed
Description: 12 deep feature with scattered guano.


Roost Site: Trigo 28
Quad: North Trigo Peaks
Location‡: 735922 E, 3696467 N
Dates Observed: 12/16/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Cave had scattered guano and two additional crevices.

Roost Site: Trigo 29
Quad: North Trigo Peaks
Location‡: 735997 E, 3696564 N
Dates Observed: 12/16/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: Scattered guano, no bats observed.
Description: Feature is a small cave 4 ft deep with signs of white wash.

Roost Site: Trigo 30
Quad: North Trigo Peaks
Location‡: 736001 E, 3696516 N
Dates Observed: 12/16/2010
Observers: J. Ernst
Feature Type: Crevice
Evidence: Scattered guano, no bats observed.
Decription: Crevice 5 ft deep turns into large overhang. Staining on wall observed.



Roost Site: Trigo 31
Quad: North Trigo Peaks
Location‡: 736043 E, 3699017 N
Dates Observed: 12/3/2010

Observers: J. Ernst
Feature Type: Cave
Evidence: Insect parts, no bats observed
Description: Feature is a 12 ft deep cave with scattered insect parts.

Roost Site: Trigo 32
Quad: North Trigo Peaks
Location‡: 736050E, 3696567 N
Dates Observed: 12/16/2010
Observers: C. Bertrand
Feature Type: Cave
Evidence: Scattered guano, no bats observed.
Description: Guano was found under cave lip. Feature is 10 ft deep.

Roost Site: Trigo 33
Quad: North Trigo Peaks
Location‡: 736067 E, 3698887 N
Dates Observed: 12/3/2010
Observers: J Ernst
Feature Type: Cave
Evidence: Insect parts, no bats observed
Description: Feature is a 6 ft deep cave with scattered insect parts found throughout.

Roost Site: Trigo 34
Quad: North Trigo Peaks
Location‡: 736090 E, 3698891 N
Dates Observed: 12/3/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: Insect parts, no bats observed
Description: Feature is 10 ft deep with stains found on walls. Insect parts were found inside cave but no bats were observed.

Roost Site: Trigo 35
Quad: North Trigo Peaks
Location‡: 736109 E, 3698732 N
Dates Observed: 12/3/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a small overhang 1.5 ft deep with stains on the wall.

Roost Site: Trigo 36
Quad: North Trigo Peaks
Location‡: 736115 E, 3696769 N
Dates Observed: 12/16/2010
Observers: C. Bertrand
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a 20 ft deep cave with one pile of guano found. Sheep scat was all present at the feature.

Roost Site: Trigo 37
Quad: North Trigo Peaks
Location‡: 736137 E, 3698041 N
Dates Observed: 12/4/2010
Observers: H. Hoffman
Feature Type: Crevice
Evidence: Scattered guano, no bats observed
Description: Feature 6 ft deep with only one piece of guano found.

Roost Site: Trigo 38
Quad: North Trigo Peaks
Location‡: 736210 E, 3697188 N
Dates Observed: 12/16/2010
Observers: C. Bertrand
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is 20 ft deep with scattered guano.

Roost Site: Trigo 39
Quad: North Trigo Peaks
Location‡: 736221 E, 3696615N
Dates Observed: 12/16/2010
Observers: J. Ernst
Feature Type: Crevice
Evidence: Scattered guano, no bats observed
Description: Feature is a small crevice .6 in deep with scattered insect parts.

Roost Site: Trigo 40
Quad: North Trigo Peaks
Location‡: 736223 E, 3696607 N
Dates Observed: 12/16/2010
Observers: J. Ernst
Feature Type: Crevice
Evidence: Scattered guano, no bats observed.
Description: Feature is 1 ft deep found along a tall rock face.

Roost Site: Trigo 41
Quad: North Trigo Peaks
Location‡: 736265 E, 3698112 N
Dates Observed: 12/4/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is 6 ft deep with only one piece of guano found.

Roost Site: Trigo 42
Quad: North Trigo Peaks
Location‡: 736278 E, 3697771 N
Dates Observed: 12/4/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: Guano, no bats observed
Description: 3 ft deep cave with a 6 ft x 6 ft wall stain below crevice. One pile of guano was found but no bats were observed.

Roost Site: Trigo 43
Quad: North Trigo Peaks
Location‡: 736281 E, 3697789 N
Dates Observed: 12/4/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: Insect parts, no bats observed
Description: Feature is a shallow 3 ft cave, with scattered insect parts found throughout.

Roost Site: Trigo 44
Quad: North Trigo Peaks
Location‡: 736285 E, 3698160 N
Dates Observed: 12/4/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Insect parts, no bats observed
Description: Feature is a 5 ft cave with scattered insect parts.

Roost Site: Trigo 45
Quad: North Trigo Peaks
Location‡: 736292 E, 3698131 N
Dates Observed: 12/4/2010
Observers: H. Hoffman
Feature Type: Crevice
Description: Evidence: Scattered guano, no bats observed

Roost Site: Trigo 46
Quad: North Trigo Peaks
Location‡: 736304 E, 3698114 N
Dates Observed: 12/4/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed.
Description: Feature is 6 ft deep with scattered guano.

Roost Site: Trigo 47
Quad: North Trigo Peaks
Location‡: 736312 E, 3698023 N
Dates Observed: 12/4/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a 4 ft deep cave found with scattered guano.

Roost Site: Trigo 48
Quad: North Trigo Peaks
Location‡: 736335 E, 3697910 N
Dates Observed: 12/4/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: 32 ft deep cave with scattered guano. Only able to explore 1/3 of cave.

Roost Site: Trigos 49
Quad: North Trigo Peaks,
Location‡: 736342 E, 3698167 N
Dates Observed: 12/4/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Shallow 2 ft deep cave found with scattered guano.

Roost Site: Trigo 50
Quad: Mohave Peak
Location‡: 736404 E, 3695092 N
Dates Observed: 1/5/2011
Observers: C. Bertrand
Feature Type: Crevice
Evidence: Guano, no bats observed
Description: Feature is 40 ft long and is 25 ft off the ground. Pack rat midden found. Three piles of guano found with a total area of 17sq ft

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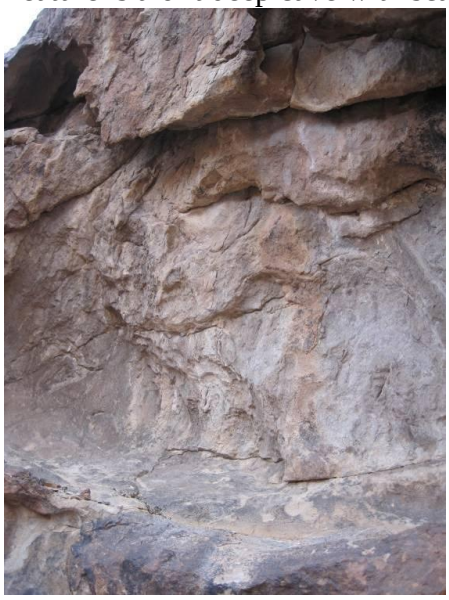
Roost Site: Trigo 51
Quad: North Trigo Peaks
Location‡: 736410 E, 3698297 N
Dates Observed: 12/3/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a shallow 3 ft deep cave with scattered guano.

Roost Site: Trigo 52
Quad: North Trigo Peaks
Location‡: 736413 E, 3698303 N
Dates Observed: 12/3/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Feature is a 6 ft deep cave with scattered guano.



Roost Site: Trigo 53
Quad: North Trigo Peaks
Location‡: 736415 E, 3698402 N
Dates Observed: 12/3/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: 10 ft deep cave with wall stains and scattered guano.

Roost Site: Trigo 54
Quad: North Trigo Peaks
Location‡: 736415 E, 3698405 N
Dates Observed: 12/3/2010
Observers: J. Ernest
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature was a 6 ft deep cave with scattered guano found within. Sheep scat found at site.

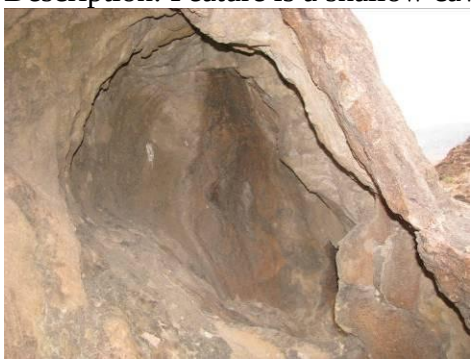
Roost Site: Trigo 55
Quad: North Trigo Peaks
Location‡: 736440 E, 3698059 N
Dates Observed: 12/3/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: 2m deep cave
Feature is a shallow 1.5 ft deep cave with scattered guano.

Roost Site: Trigos 56
Quad: North Trigo Peaks
Location‡: 736486 E, 3697633 N
Dates Observed: 12/16/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed.
Feature is a cave that is 5 ft deep with scattered guano.

Roost Site: Trigo 57
Quad: North Trigo Peaks
Location‡: 736490 E, 3697765 N
Dates Observed: 12/4/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: 6 ft deep cave
Description: Feature is a shallow cave with scattered guano.

Roost Site: Trigo 58
Quad: North Trigo Peaks
Location‡: 736523 E, 3698046 N
Dates Observed: 12/4/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is 6 ft deep found with scattered guano.

Roost Site: Trigo 59
Quad: North Trigo Peaks
Location‡: 736528 E, 3698050 N
Dates Observed: 12/4/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a shallow cave 3 ft deep with scattered guano.



Roost Site: Trigo 60
Quad: North Trigo Peaks
Location‡: 736545 E, 3697688 N
Dates Observed: 12/4/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: Insect parts, no bats observed
Description: Feature is a 6 ft deep cave with an additional crevice found inside. Insect parts, whitewash and pellets were found inside feature as well.

Roost Site: Trigos 61
Quad: North Trigo Peaks
Location‡: 736558 E, 3697647 N
Dates Observed: 12/4/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a 4 ft deep cave which had scattered guano

Roost Site: Trigo 62
Quad: North Trigo Peaks
Location‡: 736561 E, 3697647 N
Dates Observed: 12/4/2010
Observers: J. Ernst
Feature Type: Cave
Evidence: Insect parts, no bats observed
Description: Feature is a 6 ft deep cave found with scattered insect parts.

Roost Site: Trigos 63
Quad: North Trigo Peaks
Location‡: 736644 E, 3698004 N
Dates Observed: 12/3/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a 6 ft deep cave found with both scattered guano and sheep sign.

Roost Site: Trigo 64
Quad: North Trigo Peaks
Location‡: 736756 E, 3697293 N
Dates Observed: 12/28/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a 6 ft deep cave with scattered guano and whitewash.

Roost Site: Trigo 65
Quad: North Trigo Peaks
Location‡: 736957 E, 3698122 N
Dates Observed: 12/28/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Guano, no bats observed
Description: Feature is a 6 ft deep cave with one pile of guano 1 sq ft found.

Roost Site: Trigo 66
Quad: North Trigo Peaks
Location‡: 737028 E, 3696724 N
Dates Observed: 12/29/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a cave 6 ft deep found with scattered guano

Roost Site: Trigo 67
Quad: North Trigo Peaks
Location‡: 737077 E, 3697599 N
Dates Observed: 12/28/2010
Observers: C. Bertrand
Feature Type: Cave
Evidence: Guano, no bats observed
Description: Feature is 1.5 ft deep with a pile of guano 0.5 sq ft. Sheep scat was present at feature.

Roost Site: Trigo 68
Quad: North Trigo Peaks
Location‡: 737098 E, 3698225 N
Dates Observed: 12/28/2010
Observers: C. Bertrand
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Cave is 8m deep found with scattered guano and sheep scat.

Roost Site: Trigo 69
Quad: Mohave Peak
Location‡: 737191 E, 3695625 N
Dates Observed: 1/3/2011
Observers: H. Hoffman
Feature Type: Crevice
Evidence: Scattered guano, no bats observed
Description: Feature is a 6 ft deep crevice with scattered guano.

Roost Site: Trigos 70
Quad: North Trigo Peaks
Location‡: 737212 E, 3697582 N
Dates Observed: 12/28/2010
Observers: C. Bertrand
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a 6 ft deep cave with scattered guano and sheep scat.

Roost Site: Trigo 71
Quad: North Trigo Peaks
Location‡: 737249 E, 3697462 N
Dates Observed: 12/28/2010
Observers: C. Bertrand
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a 10 ft deep cave found with scattered guano and sheep scat.

Roost Site: Trigo 72
Quad: North Trigo Peaks
Location‡: 737254 E, 3697523 N
Dates Observed: 12/28/2010
Observers:
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a 4 ft deep cave found with scattered guano.

Roost Site: Trigo 73
Quad: North Trigo Peaks
Location‡: 737267 E, 3697496 N
Dates Observed: 12/28/2010
Observers: C. Bertrand
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Cave is 7 ft in length found with scattered guano

Roost Site: Trigo 74
Quad: Mohave Peak
Location‡: 737482 E, 3695320 N
Dates Observed: 1/3/2011
Observers: H. Hoffman
Feature Type: Crevice
Evidence: Guano, no bats observed
Description: Feature is a 15 ft deep crevice found with a pile of guano 2 ft^2 wide.

Roost Site: Trigo 75
Quad: North Trigo Peaks
Location‡: 739292 E, 3697650 N
Dates Observed: 12/27/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a 20 ft deep cave found with scattered guano and sheep sign.

Roost Site: Trigo 76
Quad: North Trigo Peaks
Location‡: 739596 E, 3697827 N
Dates Observed: 12/27/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is 9 ft deep, found with scattered guano and sheep sign.

Roost Site: Trigo 77
Quad: North Trigo Peaks
Location‡: 739741 E, 3697398 N
Dates Observed: 12/27/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a shallow 1m deep cave with scattered guano and sheep sign.

Roost Site: Trigo 78
Quad: North Trigo Peaks
Location‡: 739750 E, 3697373 N
Dates Observed: 12/27/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is 3 ft deep found with scattered guano

Roost Site: Trigos 79
Quad: North Trigo Peaks
Location‡: 739824 E, 3697568 N
Dates Observed: 12/27/2010
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Cave is 15 ft deep found with scattered guano

Roost Site: Muggins 1
Quad: Dome
Location‡: 751190 E, 3631106 N
Dates Observed: 4/19/2011
Observers: J. Ernst
Feature Type: Mine, adit
Evidence: Scattered guano, no bats observed
Description: Feature is a 13 ft deep adit found with scattered guano. Location has multiple shallow adits with only one with guano. Coyote skeleton found on site.

Roost Site: Muggins 2
Quad: Dome
Location‡: 752140 E, 3632357 N
Dates Observed: 4/23/2011
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is 10 ft deep and is found at the bottom of a wash

Roost Site: Muggins 3
Quad: Dome
Location‡: 753308 E, 3632116 N
Dates Observed: 4/23/2011
Observers: J. Ernst
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is 13 ft deep and was found with around 100 scattered pieces of guano.

Roost Site: Muggins 4
Quad: Dome
Location‡: 753371 E, 3632098 N
Dates Observed: 4/23/2011
Observers: J. Ernst
Feature Type: Mine, adit
Evidence: Guano, bats observed
Description: Feature is a 50 ft deep adit with four piles of guano 6 ft^2 large combined. Two California Leaf-nosed bats were observed at this location. A ram skull, horns and bones were found inside adit.

Roost Site: Muggins 5
Quad: Red Bluff Mountain West
Location‡: 759715 E, 3634591 N
Dates Observed: 4/24/2011
Observers: C. Bertrand
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature has 2 shallow adits nearby.

Roost Site: Gila 1
Quad: Cipriano Pass
Location‡: 763772 E, 3597175 N
Dates Observed: 2/9/2011
Observers: H. Hoffman
Feature Type: Cave
Evidence: Scattered guano, no bats observed
Description: Feature is a 10 ft deep cave found with scattered guano

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Roost Site: Wellton 1
Quad: Wellton Hills
Location‡: 768993 E, 3604891 N
Dates Observed: 1/15/2011
Observers: WC
Feature Type: Mine
Evidence: Scattered guano
Description: Feature was gated. Unable to determine usage.


Roost Site: Wellton 2
Quad: Wellton SE
Location‡: 771101 E, 3605109 N
Dates Observed: 1/13/2011
Observers: H. Hoffman
Feature Type: Mine, adit
Evidence: Scattered guano, no bats observed
Description: Feature is a 15m deep adit with scattered guano.

Roost Site: Wellton 3
Quad: Wellton SE
Location‡: 771507 E, 3604761 N
Dates Observed: 1/13/2011
Observers: J. Ernst
Feature Type: Mine
Evidence: Guano, no bats observed
Description: Feature is a 115 ft deep mine with a pile of guano 2 ft^2.

Roost Site: Wellton 4
Quad: Wellton SE
Location‡: 771587 E, 3604723 N
Dates Observed: 1/13/2011
Observers: J. Ernst
Feature Type: Mine
Evidence: Scattered guano, no bats observed
Description: Feature is 50 ft deep with a shaft of unknown depth. Great horned owl wing, feathers and pellets found.

Roost Site: Wellton 5
Quad: Wellton SE
Location‡: 771774 E, 3604531 N
Dates Observed: 1/13/2011
Observers: J. Ernst
Feature Type: Mine
Evidence: Scattered guano, no bats observed
Description: Feature is a mine 50 ft deep with scattered guano.

Roost Site: Wellton 6
Quad: Wellton SE
Location‡: 771834 E, 3604480 N
Dates Observed: 1/13/2011
Observers: J. Ernst
Feature Type: Mine, adit
Evidence: Guano, no bats observed
Description: Feature splits into two different adits further inside. Five different piles of guano found with a total area combined of 8 ft^2. Owl pellets also found onsite.

Roost Site: Wellton 7
Quad: Wellton SE
Location‡: 771921 E, 3604496 N
Dates Observed: 1/13/2011
Observers: J. Ernst
Feature Type: Mine, adit
Evidence: Scattered guano, no bats observed
DescriptionL Feature is 25 ft deep with scattered guano. Mine also found with owl pellets, feathers and whitewash.

Roost Site: Wellton 8
Quad: Wellton SE
Location‡: 771941 E, 3604600 N
Dates Observed: 1/13/2011
Observers: H. Hoffman
Feature Type: Mine, adit
Evidence: Scattered guano, no bats observed
Description: Feature is 50 ft deep with scattered guano found throughout.

Roost Site: Wellton 9
Quad: Wellton SE
Location‡: 772041 E, 3604200 N
Dates Observed: 1/13/2011
Observers: H. Hoffman
Feature Type: Mine, adit
Evidence: Scattered guano, no bats observed
Description: Feature is 100 ft deep found with scattered guano.

Roost Site: Wellton 10
Quad: Wellton SE
Location‡: 773793 E, 3607163 N
Dates Observed: 1/15/2011
Observers: WC
Feature Type: Mine
Evidence: Scattered guano, no bats observed
Description: Feature is 100 ft deep with very large pile of guano 120 ft^2.

Appendix B. Historical bat feature inventory for military managed lands in southwestern Arizona prior to 2010. Geographic locations are recorded in WGS 84 datum.

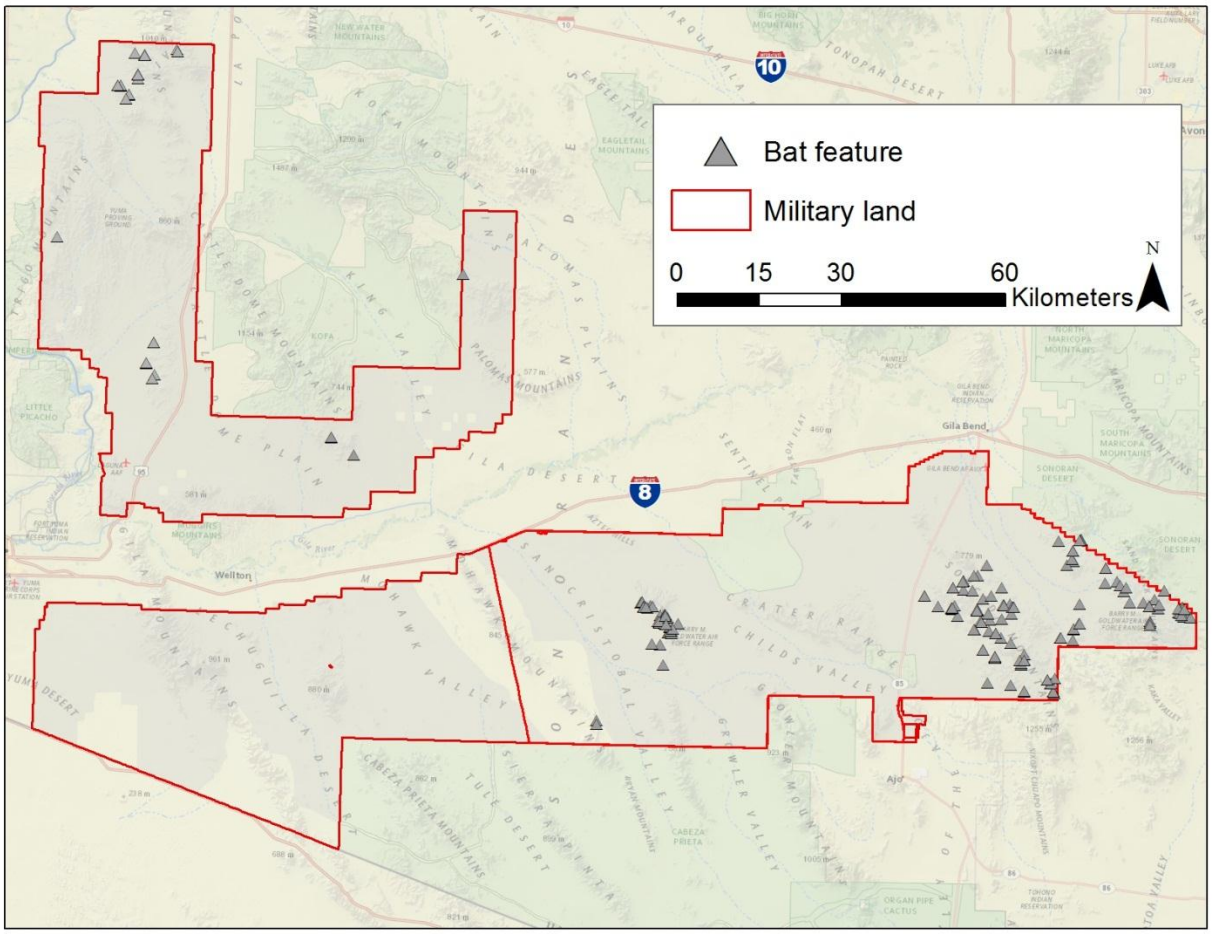
Area	Type	Zone	Easting	Northing
Aguila Mts	Cave	12S	279435	3611753
Aguila Mts	Cave	12S	279610	3611512
Aguila Mts	Cave	12S	279512	3611635
Aguila Mts	Cave	12S	280782	3611286
Aguila Mts	Cave	12S	279551	3611514
Aguila Mts	Cave	12S	282925	3611371
Aguila Mts	Cave	12S	279738	3612889
Aguila Mts	Cave	12S	279635	3607562
Aguila Mts	Cave	12S	276071	3615266
Aguila Mts	Cave	12S	280113	3612164
Aguila Mts	Cave	12S	280530	3612730
Aguila Mts	Cave	12S	277926	3614734
Aguila Mts	Cave	12S	280802	3611369
Aguila Mts	Cave	12S	280683	3612816
Aguila Mts	Cave	12S	278107	3607722
Aguila Mts	Cave	12S	276396	3615299
Aguila Mts	Cave	12S	276386	3615288
Aguila Mts	Cave	12S	281219	3609749
Aguila Mts	Cave	12S	280536	3612679
Aguila Mts	Cave	12S	281151	3609807
Aguila Mts	Cave	12S	281176	3609730
Aguila Mts	Cave	12S	281483	3610667
Aguila Mts	Cave	12S	281462	3610793
Aguila Mts	Cave	12S	280712	3611571
Aguila Mts	Cave	12S	277320	3614201
Aguila Mts	Cave	12S	280201	3603848
Aguila Mts	Cave	12S	280435	3611334
Aguila Mts	Cave	12S	276669	3614524
Aguila Mts	Cave	12S	276673	3614428
Aguila Mts	Cave	12S	278260	3614542
Aguila Mts	Cave	12S	281178	3611588
Aguila Mts	Cave	12S	279281	3611833
Aguila Mts	Cave	12S	280198	3612190
Aguila Mts	Cave	12S	280495	3612993
Aguila Mts	Cave	12S	281761	3609972
Aguila Mts	Cave	12S	281105	3612428
Aguila Mts	Cave	12S	277094	3614356
Aguila Mts	Cave	12S	280510	3612882
Aguila Mts	Cave	12S	281786	3609662
Aguila Mts	Cave	12S	280586	3612996

Area	Type	Zone	Easting	Northing
Aguila Mts	Cave	12S	281641	3609972
Aguila Mts	Cave	12S	279482	3611807
Aguila Mts	Cave	12S	280604	3612736
Aguila Mts	Cave	12S	282022	3610471
Aguila Mts	Cave	12S	280770	3611251
Area B	Cave	12S	350893	3600393
Area B	Cave	12S	333071	3613962
Area B	Cave	12S	345603	3603914
Area B	Cave	12S	338236	3611948
Area B	Cave	12S	338669	3606565
Area B	Cave	12S	338657	3606561
Area B	Cave	12S	335043	3617549
Area B	Cave	12S	338658	3615832
Area B	Cave	12S	337601	3613904
Area B	Cave	12S	327976	3616461
Area B	Cave	12S	346150	3604861
Area B	Cave	12S	346093	3605783
Area B	Cave	12S	336658	3617365
Area B	Cave	12S	350351	3601106
Area B	Cave	12S	333493	3614724
Area B	Cave	12S	339727	3609961
Area B	Cave	12S	339865	3612084
Area B	Cave	12S	341967	3608736
Area B	Cave	12S	351435	3599045
Area B	Cave	12S	335079	3619167
Area B	Cave	12S	340066	3616488
Area B	Cave	12S	339418	3600558
Area B	Cave	12S	351562	3598630
Area B	Cave	12S	338304	3611670
Area B	Cave	12S	345536	3604148
Area B	Cave	12S	351469	3598996
Area B	Cave	12S	345282	3604614
Area B	Cave	12S	334017	3612808
Area B	Cave	12S	330443	3614574
Area B	Cave	12S	340810	3605327
Area B	Cave	12S	337727	3620082
Area B	Cave	12S	343576	3614910
Area B	Cave	12S	351068	3600378
Area B	Cave	12S	340825	3605296
Area B	Cave	12S	340819	3605127
Area B	Cave	12S	337597	3613662
Area B	Cave	12S	335006	3619112

Area	Type	Zone	Easting	Northing
Area B	Cave	12S	334978	3619052
Area B	Cave	12S	337576	3613970
Area B	Cave	12S	337499	3613770
Area B	Cave	12S	343674	3600228
Area B	Cave	12S	351697	3601430
Area B	Cave	12S	332896	3614241
Area B	Cave	12S	332923	3614171
Area B	Cave	12S	327941	3616448
Area B	Cave	12S	346099	3604614
Area B	Cave	12S	337042	3620105
Area B	Cave	12S	333164	3617973
Area B	Cave	12S	333142	3617949
Area B	Cave	12S	337084	3610301
Area B	Cave	12S	350359	3601121
Area B	Cave	12S	346135	3598976
Area B	Cave	12S	340796	3605367
Area B	Cave	12S	336984	3610280
Area B	Cave	12S	346082	3599036
Area B	Cave	12S	339543	3613139
Area B	Cave	12S	340922	3609624
Area B	Cave	12S	332978	3614254
Area B	Cave	12S	341011	3609573
Area B	Cave	12S	343623	3607888
ETAC	Cave	12S	370618	3614062
ETAC	Cave	12S	355136	3622747
ETAC	Cave	12S	355105	3608334
ETAC	Cave	12S	376195	3612806
ETAC	Cave	12S	356191	3611417
ETAC	Cave	12S	369147	3611726
ETAC	Cave	12S	367872	3615205
ETAC	Cave	12S	369932	3615723
ETAC	Cave	12S	353956	3622107
ETAC	Cave	12S	369081	3611525
ETAC	Cave	12S	369038	3614482
ETAC	Cave	12S	369012	3614472
ETAC	Cave	12S	363129	3619102
ETAC	Cave	12S	344118	3614369
ETAC	Cave	12S	355238	3610304
ETAC	Cave	12S	364302	3617259
ETAC	Cave	12S	365477	3615147
ETAC	Cave	12S	375007	3614351
ETAC	Cave	12S	363692	3618405

Area	Type	Zone	Easting	Northing
ETAC	Cave	12S	374371	3613435
ETAC	Cave	12S	374659	3613258
ETAC	Cave	12S	356358	3626591
ETAC	Cave	12S	342394	3614758
ETAC	Cave	12S	342316	3614811
ETAC	Cave	12S	361107	3621437
ETAC	Cave	12S	356499	3626720
ETAC	Cave	12S	375201	3614155
ETAC	Cave	12S	356510	3626686
ETAC	Cave	12S	375323	3612625
ETAC	Cave	12S	371677	3617372
ETAC	Cave	12S	342394	3614726
ETAC	Cave	12S	376513	3612496
ETAC	Cave	12S	355187	3610372
ETAC	Cave	12S	342037	3612261
ETAC	Cave	12S	356257	3614897
ETAC	Cave	12S	339252	3622058
ETAC	Cave	12S	342100	3617966
ETAC	Cave	12S	356356	3626629
ETAC	Cave	12S	343998	3614393
ETAC	Cave	12S	352478	3626446
ETAC	Cave	12S	374888	3612926
ETAC	Cave	12S	360883	3618800
ETAC	Cave	12S	374337	3614145
ETAC	Cave	12S	356242	3611409
ETAC	Cave	12S	369142	3611107
ETAC	Cave	12S	343760	3613150
ETAC	Cave	12S	352764	3608760
ETAC	Cave	12S	352823	3608780
ETAC	Cave	12S	356291	3626592
ETAC	Cave	12S	364723	3617942
ETAC	Cave	12S	344182	3614332
ETAC	Cave	12S	344215	3614328
ETAC	Cave	12S	354934	3623167
ETAC	Cave	12S	370715	3614795
ETAC	Cave	12S	354995	3624705
ETAC	Cave	12S	354995	3624705
ETAC	Cave	12S	361077	3621472
ETAC	Cave	12S	375412	3613922
Mohawk Mts. Area	Mine	12S	268071	3593690
Mohawk Mts. Area	Mine	12S	268077	3593037
YPG	Mine	11S	747905	3654945

Area	Type	Zone	Easting	Northing
YPG	Mine	11S	741700	3709573
YPG	Mine	11S	747476	3660814
YPG	Mine	11S	746268	3656895
YPG	Mine	11S	740976	3713273
YPG	Mine	11S	747489	3660779
YPG	Mine	11S	738742	3707090
YPG	Mine	11S	740311	3705582
YPG	Mine	11S	740280	3705748
YPG	Mine	11S	741835	3708729
YPG	Mine	11S	746235	3656985
YPG	Mine	11S	747549	3654219
YPG	Mine	11S	728721	3679090
YPG	Mine	11S	738807	3707268
YPG	Mine	11S	748656	3714400
YPG	Mine	11S	742779	3713061
YPG	Mine	11S	748706	3714000
YPG	Mine	11S	742780	3712955
YPG	Mine	11S	739787	3704917
YPG	Mine	11S	738217	3707288
YPG	Mine	11S	741774	3709350
YPG	Mine	11S	738176	3707223
YPG	Mine	12S	223734	3642195
YPG	Mine	12S	243720	3675100
YPG	Mine	12S	219623	3645329
YPG	Mine	12S	219574	3645419



Supporting Figure. Historical Bat feature inventory for military managed land in southwestern Arizona, 2012.